APRIL 1, 1961

Chemical Week

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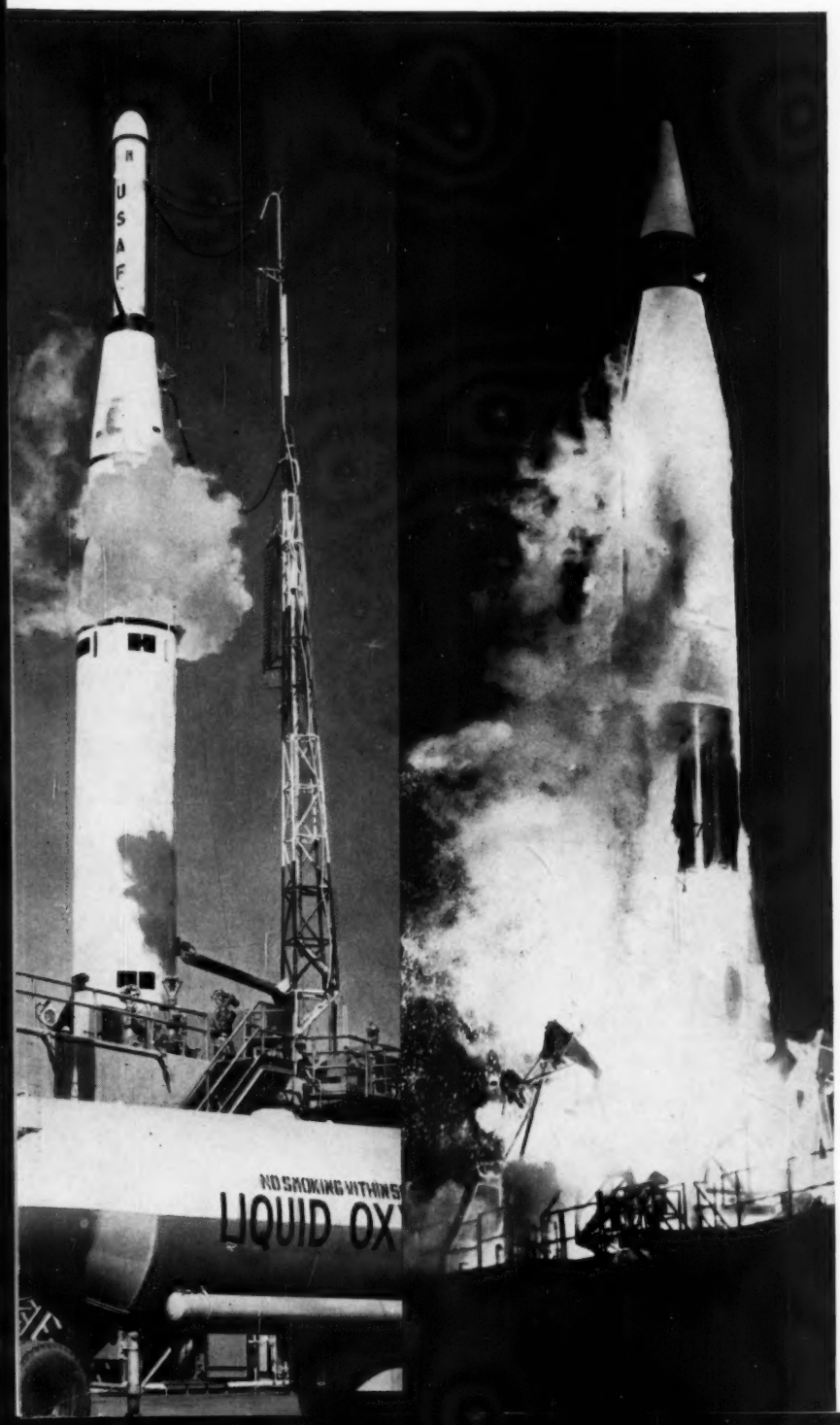

New muscle for Atlas. $17-million glycerin plant on the way—more to come? . p. 22

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Engineering gold beckons from under-developed nations. How to win it . . p. 58

Target: crabgrass. New chemical weapons enter fight against

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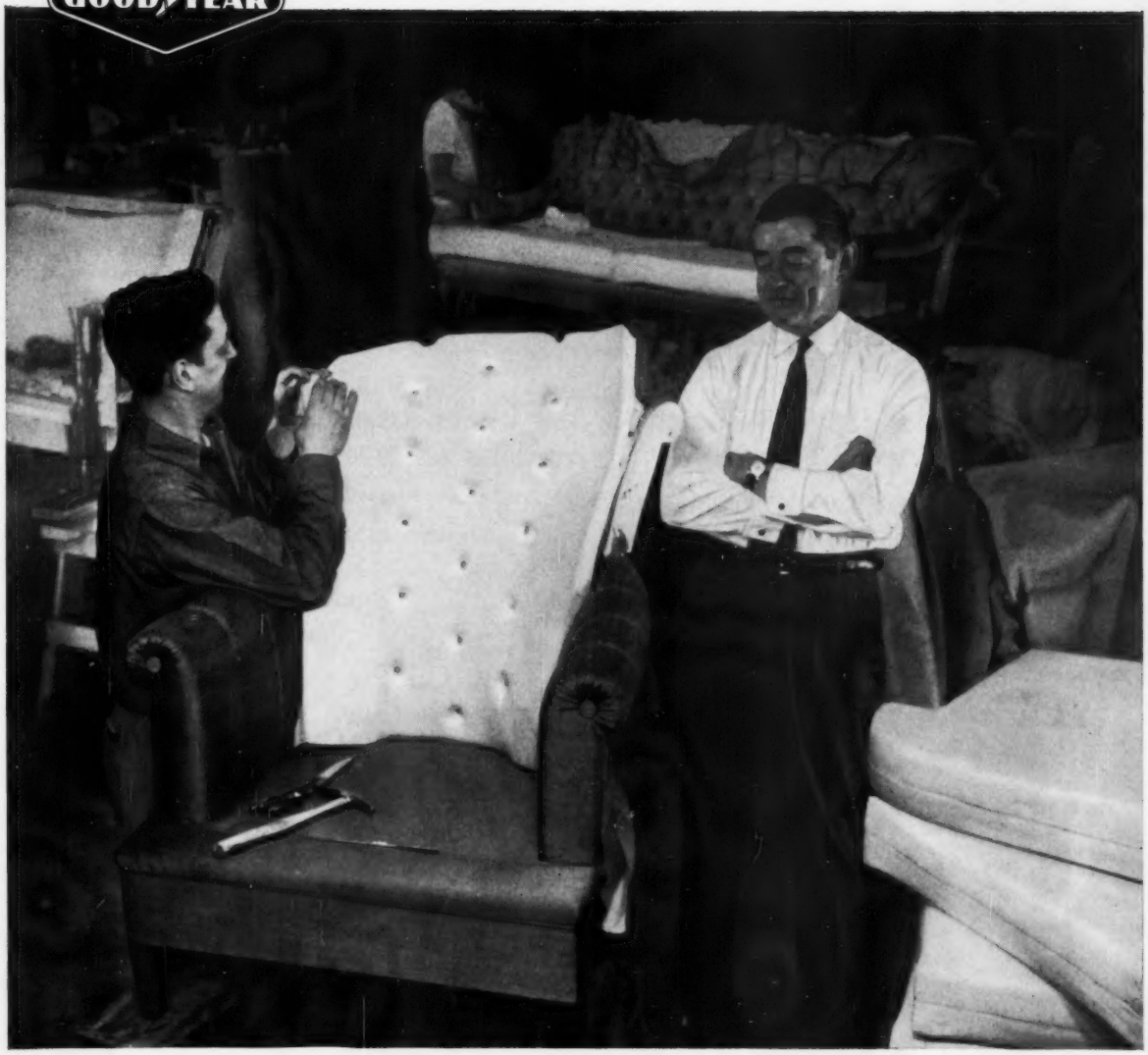

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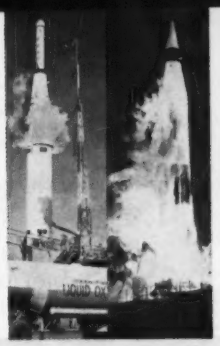

ON THE COVER: The nation's dependence on missiles accounts for part of the attention high- and low-temperature measurement is getting—here's the CPI's interest (p. 46).

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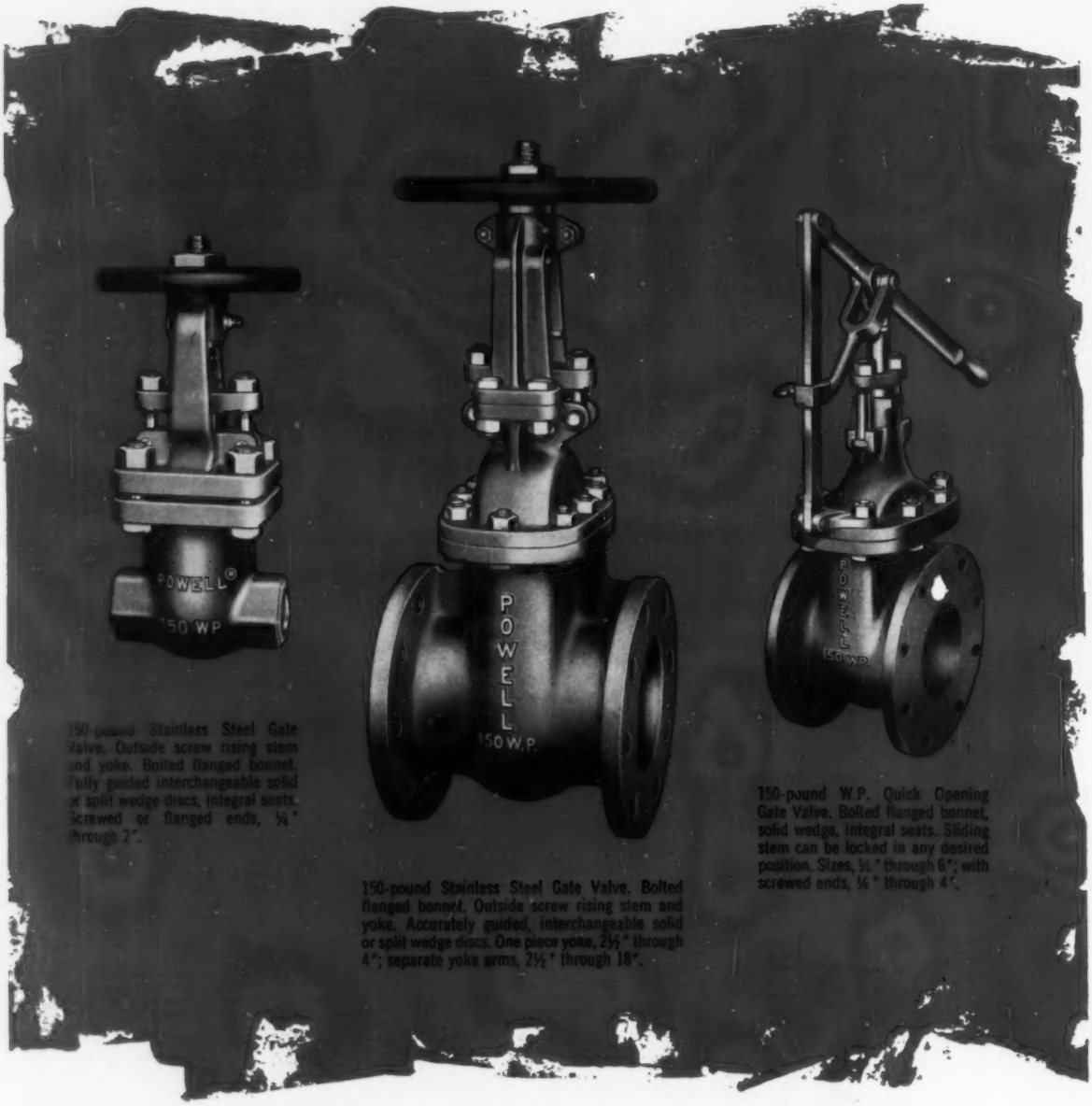

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150-pound Stainless Steel Gate Valve. Bolted flanged bonnet. Outside screw rising stem and yoke. Accurately guided, interchangeable solid or split wedge discs. One piece yoke, 2½" through 4"; separate yoke arms, 2½" through 18".

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Understanding the Researcher

RESEARCH IS BIG BUSINESS. Before World War II industry's research spending was less than $500 million; today it's over $10 billion—double what it was only five years ago; employment of engineers and scientists is rising eight times as fast as the total labor force. And so far it appears to be money well spent.

But will it continue to pay off? At the dedication of the Olin Research Center last week, President Stanley De J. Osborne told how things could go wrong:

"The concept seems to prevail that greater productivity can be achieved in research simply by appropriating more money and providing more manpower and building greater facilities. This attitude is in part responsible for one of the gulfs that seem to exist between many managements and their research organizations—a conflict having nothing to do with salaries, benefits, budgets or working conditions, and yet a conflict that if left unresolved could undermine the entire research effort. Many surveys allege that on the one hand scientific personnel feel misused, misunderstood, and unrewarded (spiritually, not necessarily financially); and on the other hand that management is really not interested in fundamental discoveries but only in money.

"The analytical scientific mind meets the less specific management mind. One is devoted to the translation of theory into concrete results; the other is weighing time, money and results of such an endeavor. One is interested in pursuing each new avenue of knowledge within his sphere of interest; the other is looking at the end result, be it near or far, in terms of profitability. One wants to investigate all angles in a decision; the other has to make decisions on limited information. One tries to postpone risk-taking; the other has to take risks regularly. One considers pressure an alien concept in the pursuit of truth; the other understands pressure as a fact of everyday business life.

"How then do we face up to this issue and solve it?

"First, we have to have better internal communications. Certainly this includes mutual understanding of each other's problems and mutual respect for each other's skills. The research director must include among his chief duties a constant liaison between management and research. Decisions to initiate, limit, or terminate projects must eventually rest with management, but the reasons for these decisions must be made known with clarity and honesty, and with sound reasoning.

"Second, there must be personal recognition for results. Advancement and salary increases are traditional business forms of recognition, but these alone are insufficient.

"Third, new ways must be found to measure individual contribution. Cost performance and the other usual management indices, which are applicable to the manufacturing, sales or administrative efforts, are not necessarily the best yardsticks for judging technical competence.

"Fourth, better systems of indoctrination are essential to minimize potential mental conflicts. A business cannot be tailored to suit the needs of any one group, and the scientist entering industry cannot be encouraged, as he often is, to the belief that he is enrolling in some sort of extension course complete with academic freedom. The scientist or engineer cannot be expected to join fully in a team effort or survive the morale problem unless he is given to understand the nature of the pressures that will be encountered, and to understand exactly what will be expected of him.

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LETTERS

TML No 'Gimmick'

To THE EDITOR: In your article, "Taking Aim at TEL" (*Feb. 4, p. 21*), it was stated that tetramethyl lead (TML) had its biggest test on the West Coast; but that interest there had slackened considerably. The article further reported that "many in the industry consider it mainly an advertising gimmick."

. . . I should like to set the matter straight. . . . We were perhaps too conservative in defining our attitude toward the importance of TML in our marketing operation.

Since last April, when Standard of California first introduced tetramethyl lead into all its Chevron gasolines, our interest in TML has rapidly increased. We certainly do not believe it to be any form of "gimmick."

It's our finding that substitution of TML for TEL in modern high-octane premium gasolines causes an average increase of at least one full octane number in road octane rating. This contention is supported not only by scientific publications of our subsidiary, California Research Corp., but also by technical articles published by researchers at Ethyl Corp., the Du Pont Co., Esso Research and Engineering Co., and Socony Mobil Co. The value of such an octane improvement is obvious to all petroleum refiners, particularly since we have been able to offer this improvement to our customers at no increase in price.

It is further apparent from the article itself that the announcements by the new manufacturers of lead alkyls concerning their intention to manufacture tetramethyl lead do not justify the application of a "gimmick" label on TML. Obviously, these new manufacturers estimate the potential market for TML will more than compensate for the considerable additional plant investment required for its production.

We at Standard of California believe TML has an excellent future, not only for ourselves, but for the entire industry. We think that as additional supplies become available, its advantages will be realized by more and more refiners.

T. S. PETERSEN
President
Standard Oil Co. of Calif.
San Francisco

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

Can't Have and Eat

To THE EDITOR: You are to be congratulated for your fine editorial "No Selling Without Buying" (*Feb. 11, p. 5*). It is surprising that so many people who are generally logical and farsighted have a blind spot on the subject of "protective" tariffs.

We can hope that your editorial may start some thinking to the effect that in this area, too, you truly "can't have your cake and eat it."

JOHN T. GOODWIN, JR.
Technical Director
Corn Industries Research Foundation, Inc.
Washington, D.C.

MEETINGS

American Institute of Chemical Engineers, New Jersey section, spring lecture series, topic: "The Statistical Design and Interpretation of Experiments"; research auditorium of Union Carbide Plastics Co., River Road (State Route 18), Bound Brook, N.J., April 6, 13, 20, 27.

Canadian Pulp and Paper Assn., technical section, second annual convention, Ottawa, Ont., April 7.

American Institute of Electrical Engineers, rubber and plastics industries conference, Sheraton Hotel, Akron, O., April 10-11.

American Management Assn., national packaging exposition, McCormack Place, Chicago, April 10-13.

American Society of Lubrication Engineers, annual meeting and exhibit, Bellevue-Stratford Hotel, Philadelphia, April 11-13.

Pacific Northwest metals and minerals conference; sponsors: Columbia section of the American Institute of Mining, Metallurgical and Petroleum Engineers, and the Spokane section of the American Society for Metals; Davenport Hotel, Spokane, Wash., April 13-15.

American Institute of Chemical Engineers, St. Louis section; symposium, including computer applications, pollution control and abatement; Coronado Hotel, St. Louis, April 14.

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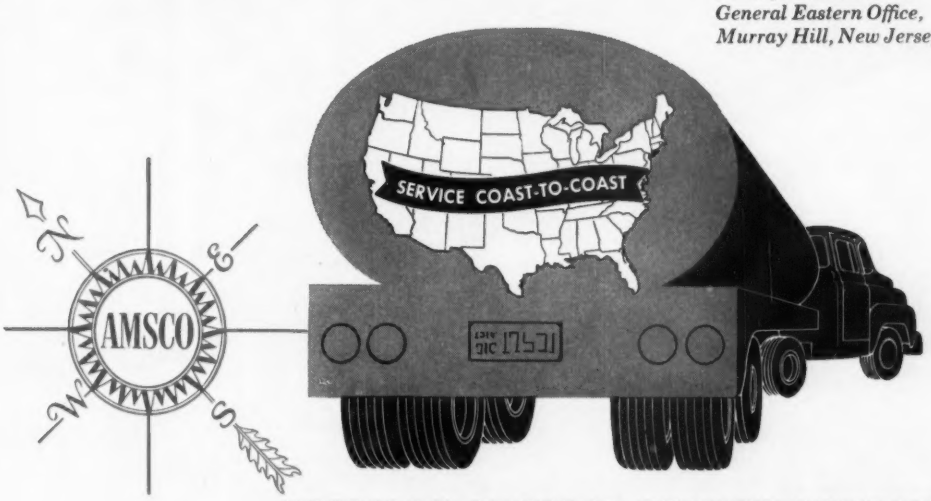

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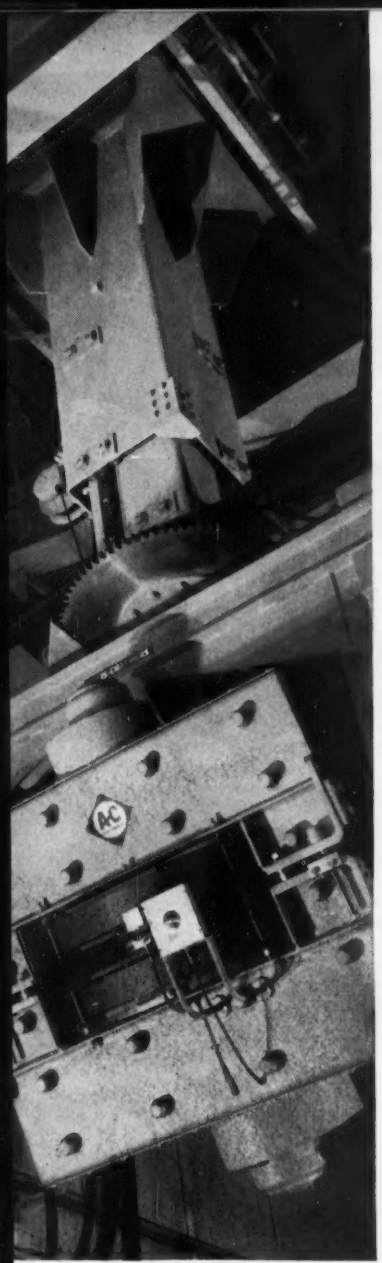

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XP61-1

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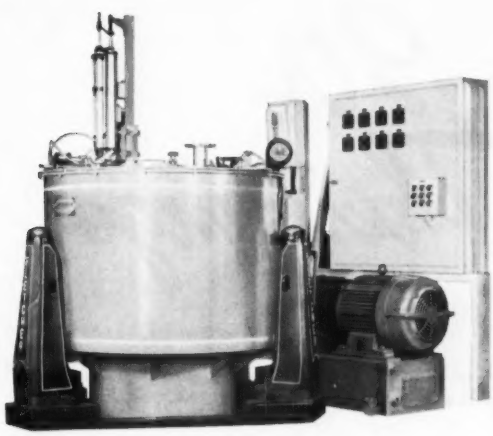

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Another "Haul Mark" design from Standard is this stainless steel chemical transport, one of two delivered to McKenzie Tank Lines, Tallahassee, Florida.

A new and unique feature is the steam manifold connecting the pressure tight ring formers providing steam heating facilities with no weight penalty. Use of ring formers as steam conductors is a feature introduced and perfected by Standard.

Designed to carry various chemicals, these trailers have stainless inner shell and stainless jacket with 3" of glass fibre insulation between. Steam manifold lines are copper, installed to enable the operator to heat each compartment individually.

Standard Steel engineers will design a "Haul Mark" tank to meet your special requirements. A phone call or letter describing your problem will get immediate response.

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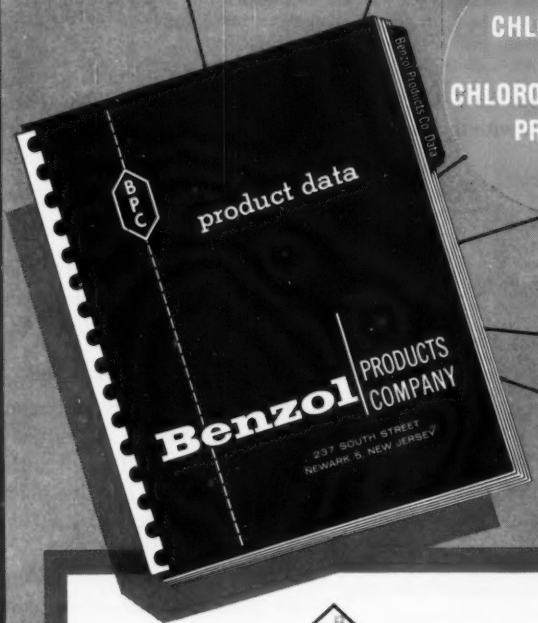

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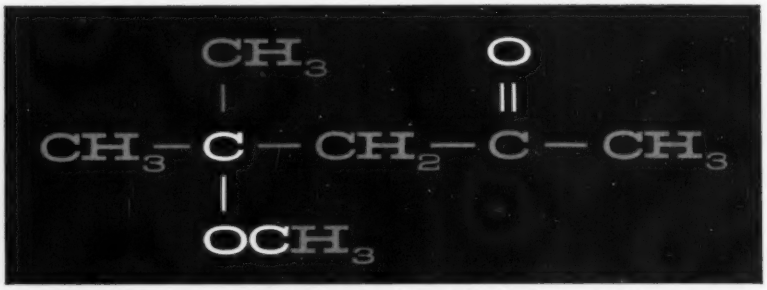
BULLETIN:

Comparative data on Shell Chemical's high boiling Pent-Oxone* solvent promises lower costs on vinyl lacquers

Pent-Oxone solvent is a keto-ether. It is a remarkable new compound of this class of chemical which gives you double solvent action plus high diluent tolerance for use with a wide range of lacquer resins.

Read how Pent-Oxone solvent compares with other high boiling vinyl solvents in evaporation and viscosity, what it costs, and where it is finding new applications in and out of the coatings industry.



Solvent action in glycol ethers comes from the COC ether linkage. In ketones, the double bond oxygen does the work. Shell Chemical's Pent-Oxone is the only commercially available solvent with *both* these functional groups.

BECAUSE it combines the solvent properties of ketones and glycol ethers in one molecule, Shell Chemical's new Pent-Oxone gives you greater solvent potential than any other type of high boiler.

This potential can often save you money. In vinyl lacquers, Pent-Oxone can replace high boilers costing 40¢ to $1.10 more per gallon.

Comparative evaporation data

Pent-Oxone is in the high boiling class with an evaporation rate comparable to cyclohexanone and EGMEE acetate. Comparisons with cyclohexanone and isophorone in seconds are as follows:

Per Cent evap.	cyclo-hexanone	Pent-Oxone	iso-phorone
10%	180	231	2600
30	560	715	8300
50	940	1200	14200
70	1330	1680	20600
90	1720	2175	27600
95	1825	2310	29500
100	2120	2450	34000

Comparative viscosity data

The following viscosity comparisons are taken after one hour on a 50/50 solvent/toluene mixture with the indicated Vinylite** resin:

10% VYNS-3	Pent-Oxone	93 cps.
	cyclohexanone	54 cps.
20% VMCH	Pent-Oxone	125 cps.
	cyclohexanone	142 cps.
	isophorone	260 cps.
20% VYHH	Pent-Oxone	310 cps.
	cyclohexanone	232 cps.
	isophorone	285 cps.
20% VAGH	Pent-Oxone	500 cps.
	cyclohexanone	320 cps.
	isophorone	405 cps.

With VAGH/Pent-Oxone solvent, viscosities rise with time. This can be overcome by using 50/50 Pent-Oxone solvent/cyclohexanone as the active solvent. Such a mixture would save you 55¢ per gallon against using cyclohexanone alone.

Better odor, lower cost, many uses

The price of Pent-Oxone is 17.5¢ per pound delivered in tank cars. It can tolerate up to 70% diluent in vinyl chloride/vinyl acetate copolymer solutions. It has a better odor than other vinyl solvents and is proving valuable in vinyl adhesives as well as acrylic lacquer thinners.

In nitrocellulose lacquers, Pent-Oxone retards blush, dries in reasonable time. It acts as a coupling agent in sludge removing compounds.

Complete data and samples

For samples and information, including complete graphs on viscosity and evaporation, write or call any of Shell's 9 Industrial Chemicals Division offices, or write Shell Chemical Co., 110 W. 51 St., New York 20, N.Y.

Do it today. Start investigating Pent-Oxone's remarkable keto-ether action for yourself.

*Trade mark, Shell Chemical Company
**Trade mark, Union Carbide Corp.

A Bulletin from

Shell Chemical Company

SHELL

Industrial Chemicals Division

Business
Newsletter

CHEMICAL WEEK
April 1, 1961

Major expansions are on the CPI's agenda this week:

• Monsanto will include a big oxo alcohols unit in its petrochemical complex at Chocolate Bayou, Tex. (*CW, Jan. 7, p. 21*), making Monsanto "basic" in all its plasticizer lines.

• Baird Chemical Industries (New York)—up to now an importer and distributor—will move into chemical production. Its first project: a sorbitol plant in the Midwest.

• Monochem—jointly owned by Borden's and U. S. Rubber—may break ground within 30 days for its $20-million petrochemical plant at Geismar, La. Capacity: 80 million lbs./year of acetylene, 150 million lbs./year of vinyl chloride. Total investment at the site, including related plants, will be about $50 million.

•

First-quarter results for chemical companies will be mixed. Diamond Alkali, Hooker, Monsanto and Rohm & Haas have indicated that their sales and earnings have been running below first-quarter '60 levels; and their experience probably will be typical in the industry as a whole. But Hercules Powder and Nopco Chemical are each expecting an increase in first-quarter volume—about 6% for Hercules, possibly 10% or more for Nopco.

At least a seasonal upturn is likely in the second quarter, with producers of fertilizers and other agricultural chemicals anticipating that this spring will bring even better sales to farmers than last year's planting season. Ammonia plants are reportedly operating at full capacity.

And more ammonia capacity is coming. At Dumas, Tex.—only about 10 miles from Phillips Chemical's big ammonia plant at Etter—Shamrock Oil and Gas Corp. (Amarillo) plans to put up a 150-tons/day ammonia plant near its McKee refinery. This unit—Shamrock's first chemical plant—is to go onstream early in '62.

•

Atlas Powder will become "Atlas Chemical Industries" if costs are not unreasonable in getting consents from companies with similar names and if stockholders approve. This is another step in de-emphasizing the explosives end of Atlas' business and stressing its chemical operations (*see p. 22*). Atlas President Ralph Gottshall believes the change would "more accurately characterize the growing diversification of our business."

•

Antitrust actions are proceeding against various chemical firms:

Defendants in California's price-fixing case against two packagers and distributors of liquid chlorine have been assigned an April 21

deadline for answering interrogatories submitted by the state (*CW Business Newsletter, Jan. 7*). One of the defendants is John Wiley Jones Co.'s Western Division, distributor for Stauffer Chemical; the other is Tops Chemical, packager and distributor of Dow liquid chlorine.

The U.S. Dept. of Justice is looking at possible chemical price fixing across the country. Last week a federal grand jury in Philadelphia subpoenaed companies in many states, demanding documents and records "which refer to payoffs, rebates, allowances or other financial arrangements between any manufacturer or distributor of chlorine, soda ash and caustic soda, and any official or employee of any public body in connection with the bidding or sale of those chemicals." Preliminary hearing will be held April 17 in Philadelphia.

And the Justice Dept.—evidently no advocate of the old maxim, "Let sleeping dogs lie"—has asked the Federal Trade Commission to look into the business of defendants in 56 major antitrust cases over the past 20 years, see if they are complying with the judgments. FTC was picked because it has subpoena powers in civil cases—which Justice does not.

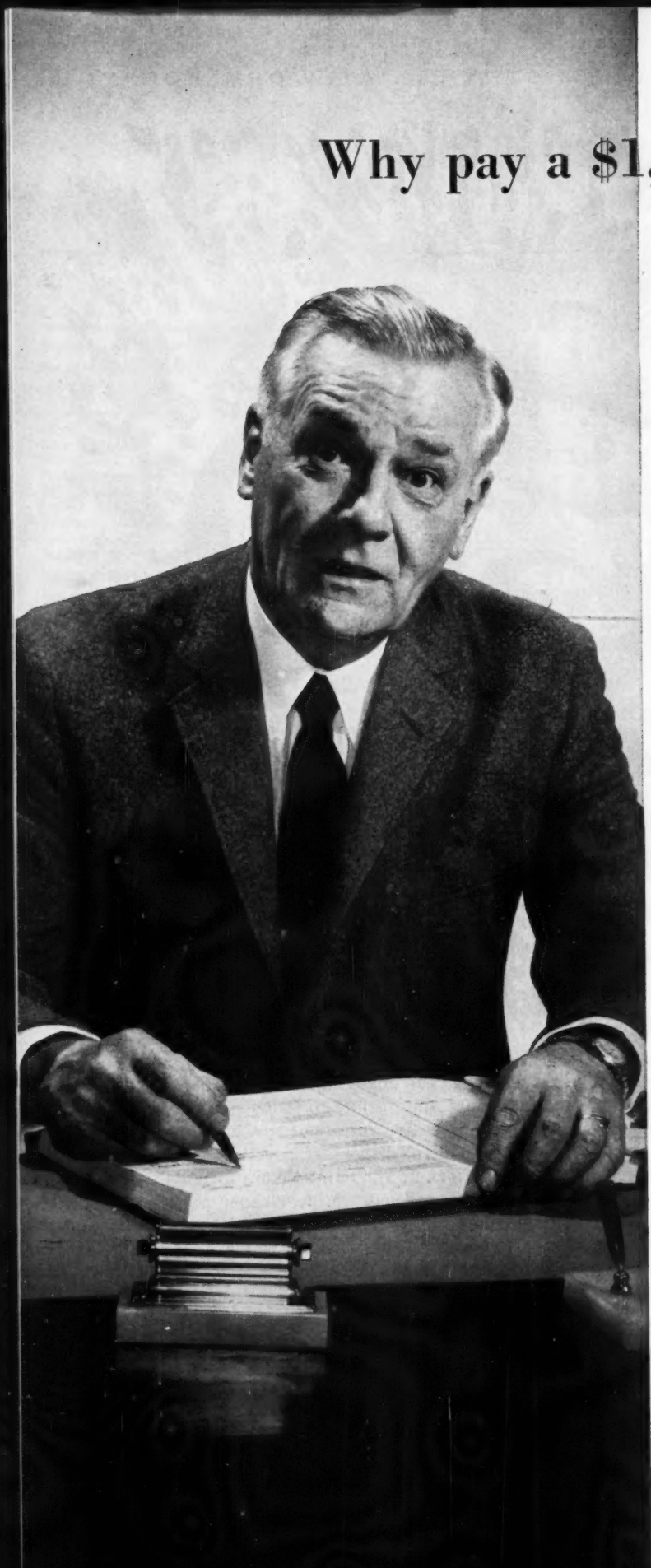
•

Britain's Imperial Chemical Industries Ltd. is feeling the industry's profit squeeze, although it doesn't show up in the over-all figures for '60. In its preliminary report ICI says it boosted sales 9.6%, to a record $1,562 million, while net profits shot up 14.4%, to $133.2 million. But all of the profit gain came in the first half of the year; in the second six months, profits were slightly below the corresponding '59 total, despite higher sales. Part of the drop was due to seasonal factors, but also in first-half '60 the company was selling off inventory, with sales running ahead of capacity. In any case, stiffening competition is clearly pulling down the profit margin.

Meanwhile, ICI will spend more than $16.8 million during the next two years modernizing a large section of its Billingham factory. The Billingham Division has developed a process for making hydrogen via light oil, at lower cost than the coke process it now uses.

Another British chemical plant for Eastern Europe: In the latest deal, Petrocarbon Developments Ltd. has signed an agreement to supply Rumania with a $2.24-million polystyrene plant. The plant will use Petrocarbon's suspension polymerization process to make all types of general-purpose and impact grades of polystyrene, plus special grades and expandable polystyrene.

The company performed engineering work for a similar plant that was completed in Poland last year, and is doing advanced process design work for a cracking plant to make ethylene and aromatics. It will be built in East Germany in association with Humphreys & Glasgow. The new agreement is the first major order for a chemical plastics plant placed with a British company since the Anglo-Rumanian trade agreement was signed last fall.



Why pay a $1,280 premium on your ETHANOLAMINES purchases?

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For specific information on savings—tank cars *vs.* drums—call your nearest CARBIDE Technical Representative. Or write: Union Carbide Chemicals Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y.

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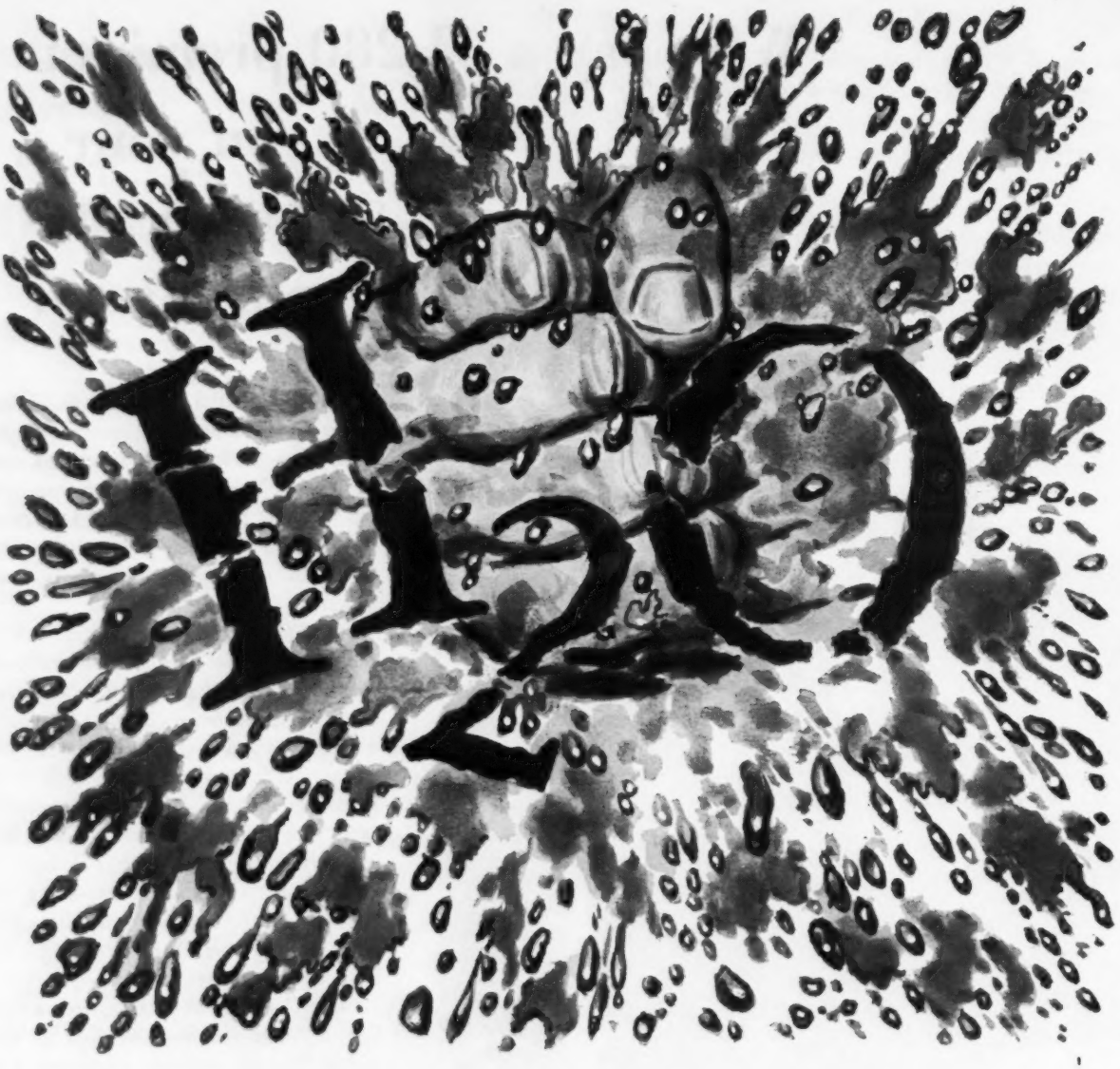

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(All dollar figures in millions)

Company	SALES 1960 Total	SALES Change from '59	EARNINGS 1960 Total	EARNINGS Change from '59	RESEARCH 1960 Total	RESEARCH Change from '59	CONSTRUCTION 1960 Total	CONSTRUCTION Change from '59
Sales of more than $250 million:								
Du Pont	2,142.6	+ 1.3%	248.8(1)	— 13.7%	96.0	+ 6.7%	213.7	+ 22.5%
Union Carbide	1,548.2	+ 1.1%	158.0	— 8.0%	86.0	+ 8.9%	219.8	+ 60.9%
Monsanto Chemical(2)	890.5	+ 1.8%	67.7	— 9.4%	42.7	+ 17.3%	121.3	+ 59.0%
Dow Chemical(3)	796.5	+ 5.2%	70.5	— 11.8%	—	—	102.0	+ 72.9%
Allied Chemical	765.8	+ 6.4%	51.3	+ 2.5%	20.5	+ 20.6%	58.2	+ 42.6%
Olin Mathieson	689.6	— 1.8%	34.7	— 7.9%	23.8(4)	+ 20.0%	48.9	+ 61.9%
American Cyanamid	578.4	— 0.9%	46.8	— 10.4%	29.1	+ 11.4%	48.3	+ 36.0%
Hercules Powder	336.9	—	27.2	—	14.1	+ 21.4%	58.8	+ 182.3%
Pfizer, Chas.	269.4	+ 6.2%	26.2	+ 5.3%	13.4	— 1.9%	23.0	— 24.0%
Celanese Corp.	264.1	— 0.4%	19.9	— 12.0%	6.1	+ 10.5%	26.8	+ 114.5%
Eastman (chemical divisions)(5)	264.0	+ 3.1%	—	—	—	—	31.0	+ 29.2%
Sales of $100-250 million:								
Grace (chemical operations)	230.0	+ 14.0%	12.0(6)	+ 15.0%	9.8	+ 15.0%	25.0	+ 65.0%
Shell Chemical(7)	229.5	+ 1.1%	—	—	—	—	18.0	— 15.3%
Stauffer Chemical	219.7	— 3.7%	19.8	— 10.8%	5.9	+ 27.5%	29.2	+ 102.1%
Rohm & Haas	218.2	+ 1.1%	21.3	— 8.1%	10.7	+ 15.1%	31.0	+ 61.5%
Merck & Co.	218.1	+ 0.6%	27.8	— 4.9%	21.0	+ 12.9%	9.4	— 16.0%
Air Reduction	202.5	+ 0.9%	14.7	— 1.1%	7.3(6)	+ 12.1%	15.7	— 49.5%
FMC Chemical Divisions(8)	163.5	+ 4.1%	—	—	5.3	+ 23.2%	16.7	+ 138.7%
General Aniline & Film	159.8	+ 0.5%	7.2	+ 1.9%	6.9	+ 3.7%	7.4	+ 26.4%
Hooker Chemical(9)	149.8	+ 0.0%	12.7	— 5.3%	4.3	+ 16.5%	15.3	+ 114.3%
Diamond Alkali	138.3	+ 0.3%	11.7	+ 3.6%	4.0	+ 0.8%	15.2	+ 59.1%
Koppers (chemical operations)(10)	131.3	+ 6.2%	—	—	—	—	—	—
ND&C Chemical Division(11)	108.6	— 8.4%	4.5(6)	— 51.6%	8.5	+ 34.9%	29.0	+ 26.1%
Sales of $60-100 million:								
Reichhold Chemicals	99.2	— 1.7%	2.4(12)	— 8.7%	2.4	+ 14.3%	9.5	— 16.6%
Witco Chemical	96.4	+ 1.4%	3.1	+ 2.6%	—	—	—	—
Pennsalt Chemicals	90.9	+ 3.9%	4.9	+ 7.8%	—	Up	9.6	+ 19.7%
Harshaw Chemical(13)	72.8	+ 1.1%	1.6	— 18.0%	2.25	+ 7.2%	2.4	+ 113.5%
Atlas Powder	70.9	+ 0.2%	3.0	— 23.5%	4.1	+ 13.9%	2.4	— 43.3%
U. S. Borax & Chemical(14)	66.7	+ 7.2%	6.9	+ 14.4%	1.65	Up	3.55	+ 18.3%
Commercial Solvents	61.8(15)	+ 1.5%	4.8	+ 69.8%	—	+ 5.0%	2.3	+ 72.6%
Pittsburgh Coke & Chemical	61.2	— 12.6%	1.3	— 51.0%	—	—	10.6	—
Heyden Newport Chemical	60.9	+ 8.8%	3.65	+ 30.8%	1.5	+ 4.1%	6.8	+ 131.4%
Sun Chemical	60.4	+ 10.2%	1.3	— 0.6%	—	—	2.3	+ 10.0%
Sales of $1-60 million:								
American Potash & Chemical	50.5	— 7.5%	5.2	+ 0.2%	—	—	7.9	+ 89.4%
Nalco Chemical	48.3	+ 2.3%	4.2	+ 2.1%	2.4	+ 20.0%	2.3	+ 46.3%
Nopco Chemical	39.9	+ 7.0%	1.8	— 21.6%	—	Up	1.5	— 28.9%
Stepan Chemical	20.6	+ 6.2%	1.0(12)	+ 21.5%	0.43	+ 7.5%	0.9	+ 71.3%
Michigan Chemical	8.5	— 2.2%	—0.1	(net loss)	0.34	— 21.9%	2.5	— 52.4%
Carwin Co.	3.2	+ 7.4%	0.08	— 15.0%	0.23	— 2.6%	1.34	+ 255.3%
Arapahoe Chemicals	1.4	+ 42.1%	0.14	+ 54.3%	0.08	+ 46.7%	0.4	Up

(1) Net operating income. (2) Including operations of Chemstrand Corp., now a wholly-owned subsidiary. (3) Sales and earnings for 12 months ended Nov. 30; other data for fiscal year ended May 31. (4) Excluding $5.2 million for government-sponsored research. (5) Covering operations of Tennessee Eastman, Texas Eastman, and Eastman Chemical Porducts. (6) CW estimate. (7) Division of Shell Oil Co. (8) Chemical Divisions of Food Machinery and Chemical Corp. (9) For fiscal year ended Nov. 30. (10) Tar Products, Plastics, and Chemicals & Dyestuffs divisions. (11) U.S. Industrial Chemicals and Kordite divisions. (12) Excluding gains or losses on sales of securities, etc. (13) Sales and earnings for 12 months ended Dec. 31; other data for fiscal year ended Sept. 30. (14) For fiscal year ended Sept. 30. (15) Excluding antifreeze operations.

In '61, Bigger Budgets for Growth

Despite the current recession and the cost-price squeeze, chemical companies are significantly increasing their research and construction budgets.

This year will see most of the country's leading chemical producers carrying out: (1) the biggest research and development programs they've ever undertaken; and (2) expansion and modernization programs that in some instances will rival the record outlays of 1957. In most cases, this year's stepped-up spending for these purposes will come on the heels of similar increases that were paid out during '60 (*table, above*) even though business was sagging in many key sectors.

Through the still higher appropriations for '61—representing a further intensification of competition in this industry — these companies will be boosting their already big investments in the future. Much of the money going into these programs will not be-

gin to earn profits for five to 10 years, or even longer.

Growth in All Groups: A *CW* survey of 40 representative chemical concerns shows that large, small, and medium-size companies all took part in last year's big rise in capital expenditures. And a similar across-the-board participation is shaping up for this year's anticipated climb in capital outlays.

Larger companies planning substantial increases in construction and modernization spending in '61 include Monsanto, Allied, Dow and Olin.

Other companies elevating their capital budgets this year: Food Machinery, W. R. Grace, Heyden Newport, and—judging by the projects it will have under construction this year—Shell Chemical.

Hooker says its '61 capital expenditures will be "much higher"; Diamond Alkali estimates its plant investments will be up by 20-30%; and General Aniline is going ahead with a construction program that will involve "more than double" last year's $7.4 million. Atlas Powder plans to put about $25 million into new plant and equipment during '61 and '62; and American Potash is forecasting expenditures of $15 million in '61 and $17 million in '62.

The only large company planning a cutback in capital spending this year is Union Carbide. Carbide—which last year boosted outlays for its chemicals and plastics division by nearly 80%, to $151 million—says its construction expenditures will continue at a high level during '61, but that they will be "substantially lower" than in '60.

While at least seven of the surveyed companies more than doubled their capital spending in '60, increases in research spending were more moderate. But while construction expenditures go through erratic ups and downs from one year to the next, research budgets appear to be on a much steadier and more relentless climb. Rising costs are recognized as one factor here; but more than 80% of last year's increases among surveyed companies were large enough to indicate that other factors—such as a drive to improve profit margins—were more to the point.

One straw-in-the-wind as to '61 research spending: Allied projects a 12.2% rise, to about $23 million.

Atlas Builds New Muscle

Atlas is on the move. Last week the company approved plans for a $17-million glycerin plant (CW Business Newsletter, March 25). Acquisition of Stuart Pharmaceutical (Pasadena, Calif.) is likely. And a multimillion-dollar expansion of its 50%-owned Solar Nitrogen Chemicals plant is in the works.

Ralph Gottshall—president and chairman of the board—explains that the company is seeking to offset the continuing loss of profit from the shrinking industrial explosives market (Atlas shut down two dynamite plants in '60) by stepping up its chemical operations and entering the ethical pharmaceutical field.

And Executive Vice-President Edward Goett tells CHEMICAL WEEK that, far from being sudden, the three moves are the result of nearly five years of planning. No other big moves are in immediate prospect, he says.

The first indication that Atlas would enter the already overbuilt glycerin market (*CW, Jan. 21, p. 61*) came as a surprise to many producers, wondering where the projected output—50 million lbs./year of glycerin and glycols—will be sold. This surprise was compounded by the information that the products will be synthesized from invert molasses. Cuba is the major source of invert molasses, and current prices on Latin-American material run high.

Goett has answers for the skeptics: Atlas will keep less than 5 million lbs. of glycerin for captive use and has contracts to sell most of the rest. Its biggest single customer reportedly will be Harshaw Chemical (Cleveland), which will both use and resell the glycerin. Atlas does expect a "marginal surplus" of ethylene glycol, however.

In addition to glycerin and ethylene glycol, a range of polyols will be produced. Some of these will be developed for captive and possible commercial use. Atlas will upgrade some of the glycols for its polyester lines, will also increase mannitol output.

No 'Distress' Call: The company's new glycerin process—hydrogenation and hydrogenolysis of carbohydrates—cannot use the cheaper, so-called "distressed" molasses, so quality of invert is more important to Atlas than price. Since the plant will not go on-stream for more than a year—and Atlas already has a year's supply of invert on hand—immediate supply is no problem. However, Goett admits that the company has been looking into possible sources, will have a firm contract if it chooses to accept it. And other carbohydrates can be used when economically feasible.

Atlas' two other major expansions highlight planned company growth. Acquisition of Stuart Pharmaceutical (*CW, Feb. 4, p. 22*) will be voted on in stockholder meetings April 25. It is expanding through outside investment—i.e., Solar Nitrogen's $17-million expansion program. Atlas owns half of Solar Nitrogen; Standard Oil (Ohio) has the other half.

Major expansion of Solar Nitrogen's Lima, O., plant has just been completed, and a new anhydrous ammonia and urea plant, built on Atlas' property near Joplin, Mo., will begin operations next month. Atlas personnel will operate the new plant.

In addition, the company expects advances in its European operations. Goett stresses that it is keeping its eyes open for possible foreign investment, although it now has no acquisition plans.

Atlas is aiming for a moderate but sustained increase in its growth rate. Emphasis will probably continue to be on steady evolution of current product lines.

Atlas' Gottshall: 'Offset explosives losses, build up chemical gains.'

Merck's Judge: A bet on epitaxials as chemicals, not components.

Status-Seeking Silicon

At last week's Institute of Radio Engineers show in New York's Coliseum, salesmen at the Merck & Co. booth were busily talking up a new kind of semiconductor material—epitaxial silicon. The novel, "predoped" form has been commercially available for only about three months, and Merck is already about to expand production at its Danville, Pa., plant. The new capacity will "more than meet projected requirements" for '61.

There is some controversy as to whether making epitaxial materials now being developed—including silicon and other types—is a chemical operation or component fabrication. In the technique, a new-growth extension of the original crystals is deposited by a heated vapor. This new growth can be controlled to contain exact amounts of the impurities needed to give the electronic device the desired electrical properties. With the epitaxial material, it's unnecessary to sandwich in thin slices of doped crystals (those containing impurities designed to impart special electrical properties). Epitaxial wafers can be better tailored to fit needs, yield such things as switching transistors that operate twice as fast as the conventional models.

Hand in hand with the question of whether they are chemically or mechanically created goes the question of who will make them. Many equipment manufacturers consider it a part of their job, plan to make their own. Others seem willing to buy. This uncertainty about which way the business will develop makes Merck's venture something of a gamble.

"It depends on the attitude of the component manufacturers," says Martin Judge, director of Merck's Electronic Chemicals Division. "Some, like General Electric, will always buy; others, like Sylvania, will always make their own."

Merck figures the market for epitaxial silicon will be in excess of $2 million/year within 12 months, with a potential of about $10 million. Merck's prices range from $7.75 to $22/half-grain wafer—depending on specifications and quantity. Merck is the only company offering epitaxial commercially now, but other silicon makers, including Monsanto and Dow Corning, are working on them. Du Pont has been producing epitaxials on a development scale for many months, and Allegheny Electronic Chemicals Co. (Bradford, Pa.) displayed epitaxial silicon at the IRE show, says it will have it commercially available shortly.

International Metalloids (jointly owned by W. R. Grace and France's Pechiney) is not planning to produce the epitaxial material, but is expanding its silicon production facilties at Toa Alta, Puerto Rico. Grace believes the epitaxial form will be of limited importance, will not be able to compete on price in some applications.

Forget the 'Food'

Food Machinery and Chemical Corp. will call itself FMC Corp. from now on (if stockholders approve), in hope that people will forget what the initials stand for. FMC's '60 sales ($364 million) were largely in machinery (37.2%) and industrial chemicals (44.9%), included such products as wind machines, lawn-watering systems, printing presses for plastic film, oil and gas wellheads, armored vehicles, and missile fuel.

Major chemical products are phosphates, barium and magnesium chemicals, agricultural chemicals, alkalis, and chlorinated chemicals.

The company was formed in '28 by a merger between Bean Spray Pump Co. and Sprague-Sells Corp. (Hoopston, Ill.), a canning machine maker. The new company was called John Bean Manufacturing Co., a name that was changed in '29 to Food Machinery Corp. The "Chemical" was added when Westvaco was acquired in '48.

Helium Help Near

Helium conservation, never effectively spotlighted before, may soon become an $80-million/year business if the government's conservation program—adopted by Congress last September and going into effect this month—follows the long-range blueprint laid out by Secretary of the Interior Udall. One crucial requirement is an initial $15-million appropriation, part of $2 billion to be spent during the next 25 years.

The program's prime objective is to cut the annual 4-billion-cu.ft. helium wastage by putting onstream, as soon as possible, 12 new helium plants, all near the Kansas gas fields. Estimated conservation by '85: 52 billion cu.ft., out of total U.S. reserves of 160 billion cu.ft. Udall plans a two-step operation to attain this end. First, the government would contract industrial firms to build privately owned and privately financed helium production plants; second, the Interior Dept. would purchase crude helium under a long-term guarantee and at a set price, and store what it did not immediately need.

Interior Dept.'s Bureau of Mines is now weighing proposals submitted by 14 firms for 22 helium plants. Four entries have been picked for first negotiations on conservation contracts: Cities Service Helium (New York); Northern Natural Gas (Omaha, Neb.); Helium Conservation Corp. (Midland, Tex.); and Panhandle Eastern Pipeline (Kansas City and New York). Additional companies will be selected as the scope of the new program broadens.

To get helium conservation moving, the bureau has requested $15 million from Congress for the first year's operations. Secretary Udall hopes to have the money by July 1—the start of the next fiscal year—so that contracts can be signed. The program calls for helium purchases of $60 million/year and private investment of between $175 million and $200 million. If the requested appropriations go through Congress, the bureau will increase the $19/mcf. purchase price by "as much as 100%" to around $40/mcf., then ask Treasury for an additional $255 million. One big expense: storage costs in the bureau's Cliffside gas field near Amarillo, Tex.

Rohm & Haas's F. Otto Haas: In old company, a new emphasis on growth.

Split Can Wait

Rohm & Haas's top officers last week paid a call to New York's financial district, where the investor is king, and courteously but firmly told security analysts that R & H shareholders will have to keep on waiting for a stock split and higher dividends. The company, they explained, needs the money for growth.

President F. Otto Haas noted that the company has been putting more money into research and new plant and equipment than ever before. For example, he pointed out that in the first five years of the past decade, research budgets averaged 3.8% of sales; during the second five years, this average was 4.8%, with last year's research and development costs reaching $10.75 million. And he could have added that construction expenditures averaged $12.1 million/year in the former period, $24.5 million/year in the latter five years, and are expected to amount to $26 million this year. In the past few years, Haas said, about half of the firm's capital outlays have been for acrylates, methacrylates, and intermediates. But he also saw promise in new R & H pesticides.

Haas reported good growth in exports, particularly since '45.

As of now, Haas expects '61 sales and earnings to dip below '60 levels. But he doesn't expect this dip to disrupt his building program.

Cleaning House in Brazil

When he's on the campaign stump, Janio Quadros waves a broom, symbol of the political and financial cleanup he promised—and fulfilled—as governor of Brazil's state of Sao Paulo. Now, as Brazil's new president, Quadros is wielding his broom again in a tough campaign to put Brazil's zooming but out-of-kilter economy on an even keel.

When Quadros' predecessor, Juscelino Kubitschek, left office Jan. 31, he left the helm of the fastest growing country in the hemisphere. Brazil's industrial boom had attracted more than $1.5 billion in U.S. private investment. But Kubitschek also left Brazil in what has been called its worst financial crisis since the '30s, marked by soaring inflation and enormous deficits in the budget and in the balance of international payments.

Sweeping Up: In the past few weeks, Quadros has taken the first steps in cleaning up this economic mess. His principal measures so far include an order for a 30% cutback in government development spending, moves to trim the government expenses, and a measure practically ending subsidies for oil, wheat, newsprint and fertilizers.

The subsidies cut is part of a program to convert Brazil's foreign exchange from multiple rates to a single rate, and to start on the road toward solvency by cutting imports, boosting exports and reducing the treasury drain.

The subsidies cut will be accomplished by doubling the preferential foreign exchange rate on oil, newsprint, fertilizers, etc. Except for these items and luxury goods, the new order also places all general merchandise —including chemicals—on the free market. Previously, importers bought exchange at government currency auctions for less than free market rates.

By making imports more expensive, the moves should help reduce them. But another measure in the new regulation should have a much more drastic effect in cutting imports. This aims to immobilize capital by making importers deposit with the Bank of Brazil the equivalent of the cruzeiro purchasing price of their dollars.

More Medicine: Quadros has promised other measures. One undoubtedly will be tightening bank credit. Also likely are higher income and excess profit taxes and elimination of price controls.

Foreign businessmen have taken special note of Quadros' call for a measure limiting profits remissions. Several such bills already are in Congress. Considered most likely to pass is a mild one restricting remissions to 10% of capital.

The big danger is that by tightening up too suddenly Quadros could plunge Brazil into a depression which would have fatal economic and political results. Quadros is apparently aware of the danger. He faces trouble enough from the public, which voted for him hoping he would stop inflation and which now faces a necessary period of even more inflation at the same time the government tries to hold the line on wages.

Businessmen in Brazil generally hail Quadros' moves as promoting long-run stability. U.S. officials in Washington also approve, and are optimistic he can carry it off.

And U.S. approval is important, for Brazil needs massive new loans to solve its foreign-exchange problem and consolidate its debts.

WIDE WORLD

Brazil's President Quadros plays delicate game of economic stabilization.

national roundup

Rounding out the week's domestic news.

Companies

Kern County Land Co. (San Francisco) has dropped its attempt to acquire potash producer Bonneville, Ltd. (*CW, March 11, p. 23*). Apparent reason: disagreement on the stock-exchange ratio, an issue that had blocked past negotiations. Meanwhile, Kern is looking into borax-deposit property adjacent to U.S. Borax's big open pit operation at Boron, Calif.

Champion Paper & Fibre (Hamilton, O.) now has full stockholder approval for acquisition of Carpenter Paper Co. (Omaha, Neb.), a Midwestern paper distributor with outlets in 33 cities and '60 sales of $107 million. Champion—grossing $195 million last year—will operate Carpenter as a wholly owned and separately managed subsidiary.

Aluminum Co. of Canada has purchased the assets of Cochrane Foilwares (Rexdale, Ont.), manufacturer of rigid aluminum foil containers. Raw material for the new subsidiary will be supplied from Alcan's recently expanded foil mill at Kingston, Ont.

Smith Kline & French Laboratories (Philadelphia) has completed the expected acquisition of Julian Laboratories (Chicago), including the Mexican facility, Laboratorios Julian de Mexico, S.A. (*CW, Jan. 28, p. 23*). Julian manufactures intermediate chemicals for production of steroid medications.

Procter & Gamble (Cincinnati) shareholders have approved a two-for-one split of the company's common stock.

Expansion

Polyethylenes: W. R. Grace & Co.'s Polymer Chemicals Division has awarded a contract to The Fluor Corp. (Los Angeles) for expansion of Grace's polyethylene production at Baton Rouge, La. (*CW Business Newsletter, Dec. 3, '60*). Construction is scheduled to start this month; completion is set for August.

Soybean Oil: Columbia Vegetable Oils (Seattle) will build a $1-2-million soybean-processing and soybean oil-refining plant at Quincy, Wash. The unit is due onstream early in '62. Capacity: 10 million lbs./year of soybean oil, 45 million lbs./year of soybean meal and flour.

Cement: Southern Cement Co. (Birmingham, Ala.), division of American-Marietta (Chicago), expects to start building a new cement facility this summer at Atlanta, Ga. Initial capacity, using one kiln, is set for 1.5 million bbls./year of portland cement; installation of a second kiln would double this to 3 million bbls./year.

LPG: Shell Oil (New York) has awarded to Delta Engineering Corp. (Houston) a contract for construction of its natural gas processing plant near Sealy, Tex. Building will begin in May; onstream date is Sept. 1. LPG production: 21,000 gal./day from 15,000 mcf. of gas.

foreign roundup

Rounding out the week's international news.

Foreign

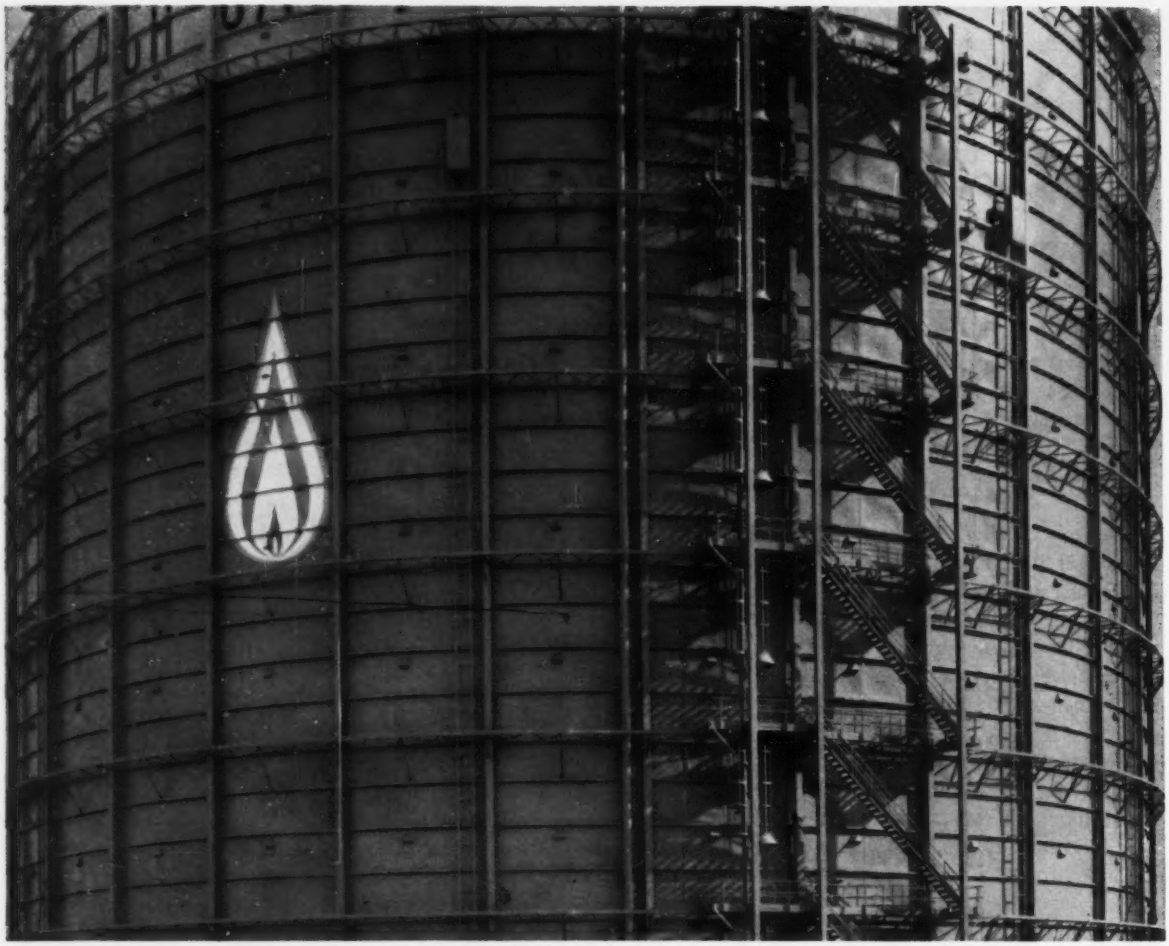
Sulfuric Acid/Mexico: Compania Mexicana de Explosivos S.A., a wholly owned subsidiary of Du Pont, has named Britain's Chemical Construction, Ltd., to design a 30-short tons/day sulfuric acid concentration plant. Explosivos will build it.

Expansion/Colombia: Minnesota Mining and Manufacturing (St. Paul) has formed Minnesota Manufacturera y Mercantil S.A., a Colombia, South America, subsidiary. The plant (at Bogota) will produce a number of products including adhesives, coatings and sealers. Production will begin by the end of '61.

Paints/Germany: The Glidden Co.'s (Cleveland) new International Division has bought one-third interest in Hermann Wulfing-Wings Lackfabrik, a West German producer of industrial paint and automotive finish. Glidden's Swedish licensee, AB Wilh. Becker, also acquired a one-third interest in Wulfing.

Expansion/Germany: Farbenfabriken Bayer AG. is negotiating with Antwerp harbor authorities for a 370-acre construction site on which to build its fifth plant. Bayer's reasons: ideal location for processing and temporary storage of incoming raw materials and a large, untapped labor reservoir.

Petrochemicals/Rhodesia: The Rhodesia Federation's Ministry of Commerce and Industry plans an extensive study of petrochemicals, presumably to induce up to $50 million in foreign investments. American Independent Oil Co. has already agreed to start construction of an oil refinery due onstream in '63, at Salisbury, Southern Rhodesia.



50 CUBIC FEET? 5,000,000 CUBIC FEET?

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General American designed and fabricated this 5,000,000 cu. ft. Wiggins Gasholder, and General American crews erected it for the city of Long Beach, California. (General American makes gasholders .00001 this size, too.)

Only Wiggins Gasholders use the patented dry fabric seal that is unaffected by weather. Only Wiggins Gasholders have no water, no grease, no tar, no complex, unsightly lifts. Wiggins Gasholders need no expensive foundations. Virtually no maintenance and operating costs.

Through years of experience with more than 500 installations of all sizes, General American Wiggins Gasholders have proved the safest, most economical of all. *It pays to plan with General American.*

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WIGGINS VAPOR SEALS GENERAL AMERICAN TRADE MARK

Washington
Newsletter

CHEMICAL WEEK
April 1, 1961

The long-heralded federal move against counterfeit drugs is under way. And indications are that this is only the beginning. Comments an official of the Food and Drug Administration: "It would be safe to say that our investigations in this area have not yet been completed."

FDA and the Justice Dept. have both moved in with formal suits charging General Pharmacal Co., Inc. (Hoboken, N.J.), Lowell Packing Co. (Long Island City, N.Y.), and eight individuals with violations of the Federal Food, Drug and Cosmetic Act. Charges, filed in Newark, N.J., federal court, include counterfeiting of drugs and adulteration of reducing pills (*CW, Sept. 10, '60, p. 132*).

Nineteen of the counts charge counterfeiting of Miltown and Equanil, tranquilizers; Diuril and Hydrodiuril, diuretics; Esidrix and Serpasil, blood-pressure reducers; Tedral, an anti-asthma drug, and Metricorten, a multipurpose compound. The Justice Dept. also charged that a reducing pill called Obes-Ebb includes less active ingredients than appears on the label.

Sen. Estes Kefauver (D., Tenn.), chairman of the Senate Anti-Trust and Monopoly Subcommittee, also plans hearings on the general subject of drug counterfeiting and the sale of falsely labeled drugs.

•

Faster expansion of chemical process industries abroad seems a certain long-term result of President Kennedy's five-year foreign aid program. Over the shorter run, it's likely to stimulate U.S. exports of pharmaceuticals, fertilizers and other agricultural chemicals.

The foreign aid package is bold. It would establish a semi-autonomous aid administration within the State Dept. This agency would take over all functions formerly performed by the International Cooperation Administration, the Development Loan Fund and other such agencies (*see also p. 58*).

The proposed borrowing authority would be used to finance development loans for periods of up to 50 years and at little or no interest. These would be in addition to some $1.5 billion a year in other forms of economic aid. Military aid would be administered separately by the Defense Dept.

Emphasis of the program on land reform and public health as a prerequisite for industrialization is bound to spur exports of fertilizers and pharmaceuticals initially. But since the aim is to make a significant number of underdeveloped countries self-supporting by '70, local chemical companies will be encouraged wherever possible. This is particularly true since simple chemical plants generally are among the earliest components of industrialization because they are relatively easy to finance and operate.

Washington Newsletter

(Continued)

The issue of automation has come of collective bargaining age. The AFL-CIO United Rubber Workers has drawn up a list of "age-of-automation" demands for spring bargaining sessions with three of the major rubber manufacturers—Firestone, Goodyear, and Goodrich.

The key goals: a shorter work week, earlier retirement, a limit on overtime work to "unusual and essential situations," first hiring rights at new company plants, severance pay for laid-off workers and improved supplementary unemployment benefits. The final demand in an 11-point program is for a jointly administered automation fund that would be used to help reach the union's other goals.

•

The government denies it will need another liquid-hydrogen plant in the near future. Trade reports have been circulating that bids would soon be asked on such a plant, but both the National Aeronautics and Space Administration and the Air Force claim there is nothing to the rumor. NASA says it may need a third plant in a couple of years, but that it has no immediate plans to call for bids. Linde Division of Union Carbide Corp. has contracts for the two NASA plants (*CW, Dec. 17, '60, p. 22*).

•

The Kennedy Administration hopes to spur exports, including chemicals, with new credit policies being developed by the Export-Import Bank. Officials expect to give U.S. exporters credit opportunities at least equal to those available to foreign competitors.

The Ex-Im Bank will offer, through private insurance companies, a comprehensive system of all-risk guarantees for products sold on short-term credits up to six months. The bank also is extending its coverage of medium-term credits—six months to five years—to include semifinished materials and products, in addition to capital equipment.

Equipment sales to foreign government-owned oil companies is now authorized for Ex-Im Bank assistance. The bank also is expected to make a general liberalization on criteria for credit.

•

Surplus corn for alcohol production may be made available to domestic producers by the U.S. Dept. of Agriculture in the near future. Publicker Industries Inc. (Philadelphia) is pushing for a favorable decision so that it can substitute corn for 120 million gal. of blackstrap molasses it has agreed to buy from Cuba. President Kennedy has frowned on the Cuban molasses deal because of this government's efforts to restrict trade with the Castro regime (*CW Market Newsletter, March 4*).

Many details remain to be worked out. In fact, department officials say they are not as far along in their considerations as they were a year ago, when it was announced that cut-price corn would be available to alcohol producers. If the department decides to make the corn available, it will be to all comers who offer acceptable bids, and will be on an experimental basis to determine whether large-scale conversion of corn into alcohol is economically feasible.

THE ANATOMY OF A FRAGRANCE . . . .

PICTURED HERE ARE THE INGREDIENTS THAT COMPRISE PERFUME COMPOUND No. 34131 . . . .

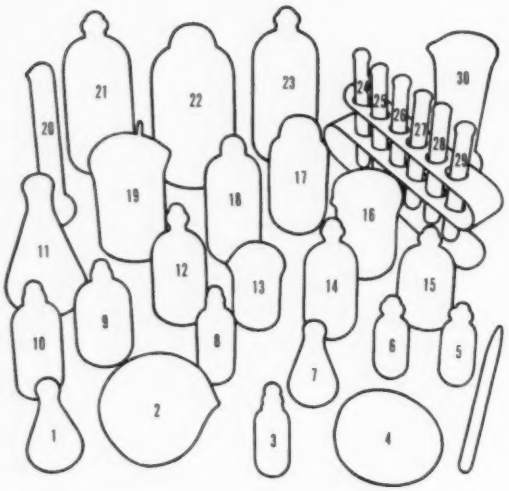
While this is a fairly simple formulation containing some thirty different constituents, it serves—when presented in this manner—to illustrate the complexity of a typical fragrance. By referring to the keyed diagram on the back of this insert, all ingredients can be identified. As supplier of these ingredients, *ours* is the responsibility for *each* product's purity, uniformity and quality . . . and we pursue this obligation zealously. Whether in the manufacture or processing of these materials, or in the careful investigation and selection of supply sources where botanically derived natural oils are involved, our first consideration is for the superiority and salability of the finished product. When it comes to providing a proper solution to a customer's specific problem, then the experience and aesthetic discrimination of our creative perfumers are brought into play. Thus, with skill and patience, we achieve a result such as Compound No. 34131, presented—anatomically—above. FRITZSCHE is a name truly dedicated to *product salability* through *finished product quality* . . . that is why we feel our materials and services are so vitally important to YOU.

SEE OVER

1871... FRITZSCHE ...1961

OUR 90th AND GREATEST YEAR!

KEY TO PHOTO *(on facing page)* . . . .



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7. 10% Solution **ALDEHYDE C-11 IN ALCOHOL**—Commercially available synthetic.
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9. **FRITZBRO® SYNTHETIC FLOWER OIL RED ROSE**—F.B. specialty.
10. 10% Solution **ABSOLUTE CIVET IN ALCOHOL**—Exclusive Clifton process.
11. **VETIVER ACETATE EXTRA**—Clifton produced synthetic.
12. **METHYL IONONE GAMMA**—Commercially available synthetic.
13. **ABSOLUTE OF OAK MOSS SEILLANS® F-27**—Exclusive source of supply.
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16. **VETIVEROL**—Isolated by Clifton process.
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IT'S BEEN TRULY SAID that you can't make a silk purse out of a sow's ear. By the same token, no perfumer, however skilled, can compose a fragrance masterpiece from materials of dubious grade. In fact, purity and uniformity are critical factors in the evaluation of any ingredient intended for the perfumer's use. That is why FRITZSCHE's 90-year record of experience and reliability is so important to its customers. That is why FRITZSCHE strives for continuing betterment of its products through advanced research, automatic instrumental analysis and control, and—wherever possible—by the employment of new and improved production techniques. By such means it hopes to make 1961 the *greatest* in all its years! . . . greatest for its customers . . . greatest in the quality of its products and services.

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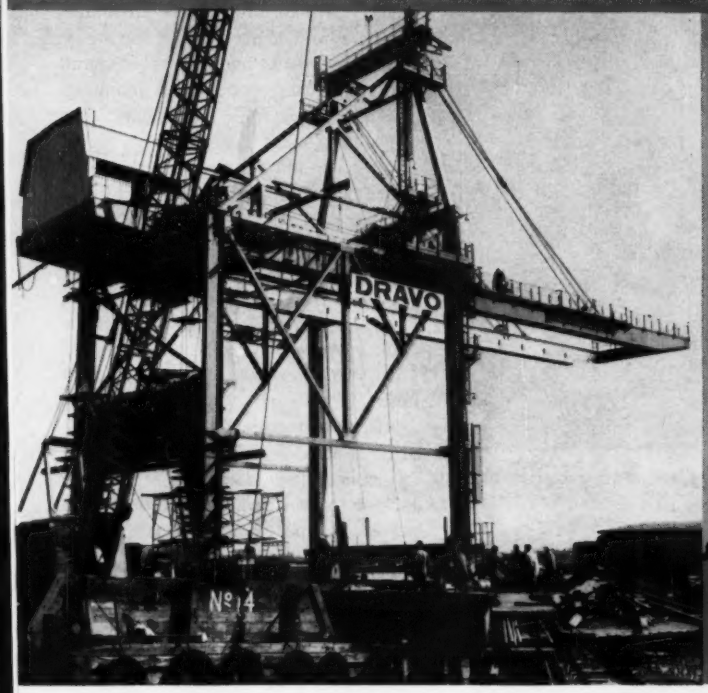
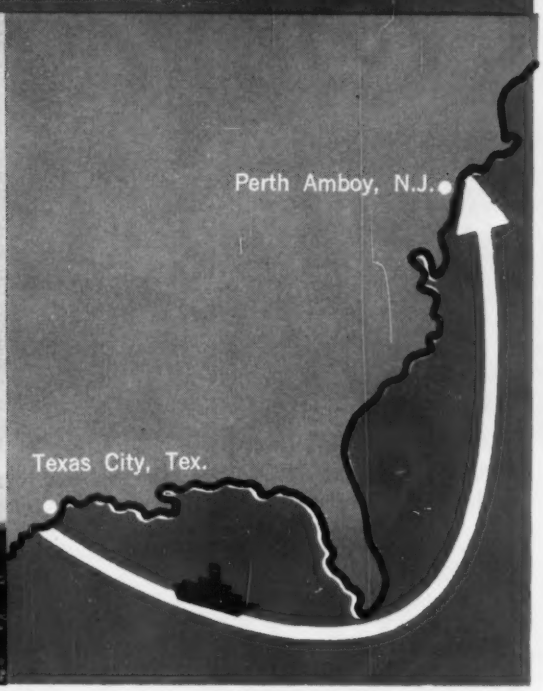
New Equipment Sends Bulk Containers By Sea





Carbide Bets on Bulk-Plastics Shipping

Bulk-plastics hauling will soon be entering a new phase. Union Carbide is putting the finishing touches on two giant terminals—in Texas City, Tex., and Perth Amboy, N.J.—to accommodate the first bulk-container shipments of polyethylene and vinyl resins aboard specially designed tankers. Carbide's venture can do much to determine the extent to which bulk handling can lower freight costs, speed operations and reduce labor operations.

Carbide's first tanker will leave the Texas City terminal in mid-May, carrying—besides liquid products—a load of novel, van-like aluminum containers each holding some 2,000 cu.ft. (40,000-50,000 lbs.) of resin. Later this year a second tanker will enter service. With two vessels moving with full loads—up to 192 containers per load—terminal throughput is estimated at 400 million lbs./year.

When the kinks are worked out of the system—in another year or so—there will be virtually no Carbide people around to work in the terminal. The whole operation will be run by the OTD (Origin to Destination) Corp. (Chicago), under a general manager from Carbide. Project director Norman Meyers of Carbide will stay on until all is running smoothly.

Competitive Picture: Despite the completeness of Carbide's semiautomated packaging and storage center in Perth Amboy, and its transport system in general, the operational economy of the setup will have to be proved. Handling costs likely can be trimmed 0.3-0.5¢/lb.—but at this rate, it will likely be 4-6 years before the firm has written off its initial capital investment in docks and equipment.

Plastics makers agree on the cost advantages of moving materials in bulk containers. For moving by ship, however, the high capital outlay for docks and terminal equipment—probably $4-6 million for Carbide—discourages all but the biggest producers. Some say that a company must handle 50-100 million lbs./year of plastics before shipping operations of this sort are economical.

Even then the company must be assured of continuous, high-volume shipments. One firm, whose total production is well above these capacity requirements, cites this factor of volume continuity as a deterrent to a bulk-tanker operation: "Our production centers are divided, so that one resins source cannot supply adequate volume to warrant such an outlay."

Faster handling in bulk containers is another of Carbide's hoped-for savings. Fully loaded, its tankers can carry 192 of the 8x8x30-ft. aluminum containers. After a 5½-day trip from Texas City, the bulk cargo will be unloaded at Perth Amboy. Here the resins will be distributed five ways:

(1) Dumped into hopper cars and trucks for delivery to customers.

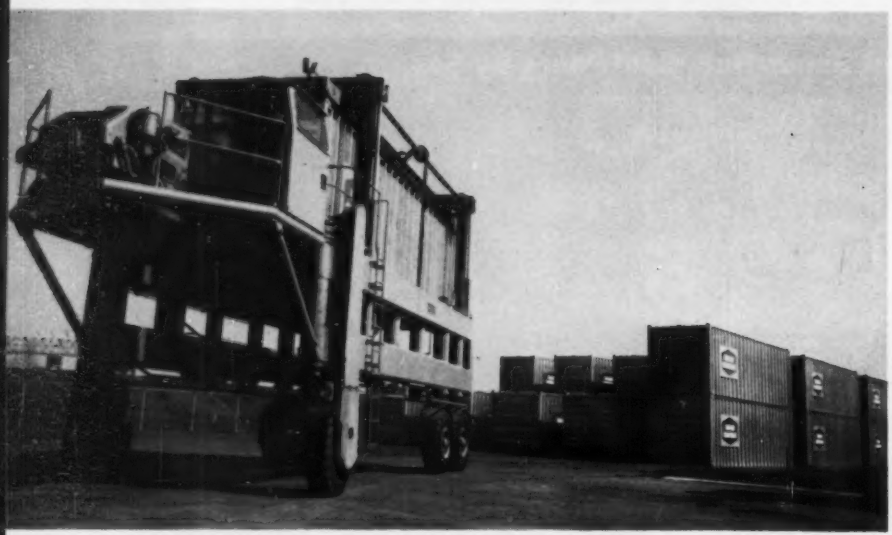
(2) Carried, still in the containers, on special aluminum truck chassis to Carbide's Bound Brook, N.J., plant.

(3) Stored "as is" in the containers.

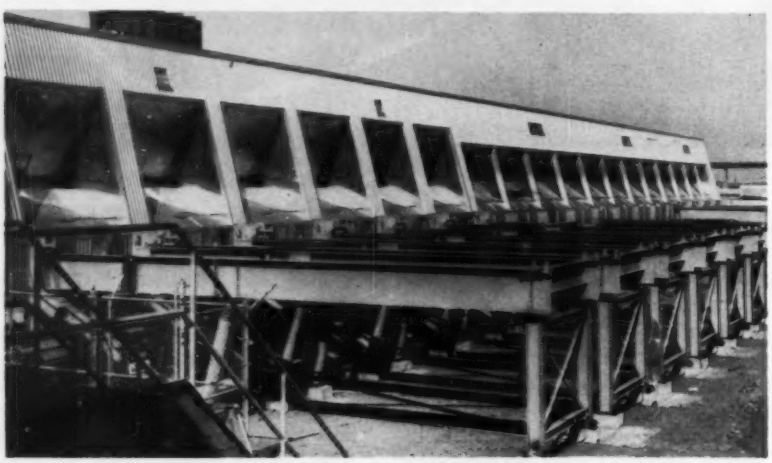
(4) Bagged and stored in 2,000-lb., 50-bag pallet loads.

(5) Shipped to customers in other kinds of bulk containers (e.g., rubber tanks, steel or aluminum bins).

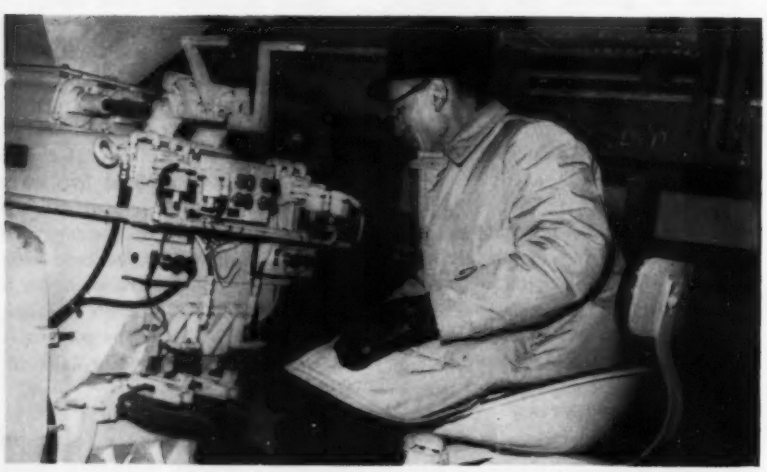
Initially, Carbide will make no van



After the containers are unloaded from the ship, they are moved by straddle carrier to the warehouse, where some are loaded onto . . .



. . . tilt frames, which dump the resins into hoppers for . . .



. . . automatic bagging, as project manager Norman Meyers demonstrates.

deliveries directly to customers—since none of them is set up to unload them. But it is trying to develop other methods by which customers can take van loads without having to invest in costly handling equipment. Most promising: pneumatic handling, gravity unloading (something like a dump truck). Big customer incentive: bulk shipment discounts.

Quicker Delivery? "Unloading and bagging at Perth Amboy will be faster than the old method of shipping already-prepared pallets from Texas City to our Carteret, N.J., terminal just north of here," says Meyers. "New equipment will permit unloading of about 8 million lbs. of material in 20 hours."

After unloading, specially constructed straddle carriers will tote the containers—two at a time—from the dock to the warehouse. Material to be bagged will be dumped into hoppers, which feed the semiautomatic bagging and palletizing equipment. Then the pallets—containing forty 50-lb. bags—will be stacked in the 250,000-sq.ft. warehouse.

Although bulk containers can be handled on the ships quicker than pallet loads of material, some producers see delays inherent in shipping.

"We find it faster," says one company, "to send resins from the Texas-Gulf area to the Northeast in covered hopper cars. A freighter trip around the tip of Florida, plus unloading and moving to a warehouse, must make it tough to set up tight schedules."

Rail Fans: Although transportation costs are higher by rail than by ship, bulk-hopper car users cite these advantages:

- No high shipping equipment and dock investments.
- Lowered rail rates for high volume—hoppers carry about 100,000 lbs. of material.
- Direct delivery to customers without time-consuming unload and reload operations. Many plastics producers point to covered hopper cars as an answer for bulk haulers who can't invest in shipping. The lower rail rates and ease of delivery help keep smaller plastics producers competitive with large-scale, cost-cutting operations such as Carbide's.

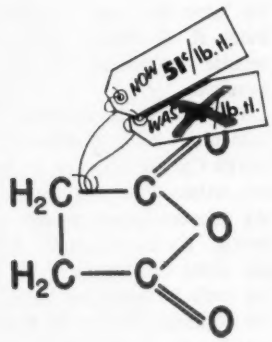
New Equipment: Before Carbide's new tankers make the first shipment, several innovations will be made in loading and shipping equipment to ac-

Success Story!

New capacity to meet increased use

National® SUCCINIC ANHYDRIDE

at our new low "incentive price"



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IT IMPROVES PRODUCTS Imparts many valuable properties to coatings, resins, plasticizers, elastomers, adhesives. It is also emerging as an important intermediate in pigments, pharmaceuticals, cosmetics, perfumes, corrosion preventives, lube-oil additives, insect repellents and the like.

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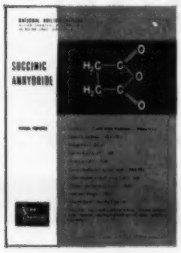

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commodate the bulk-handling operations. The cranes for loading and unloading the containers are standard equipment. However, the three straddle carriers are the only ones on the East Coast. (Matson Lines is using three similar ones in Hawaii.)

To carry loaded containers directly to its Bound Brook plant, Carbide had lightweight aluminum truck chassis built to conform to highway weight limitations. The containers are aluminum, with a top-side loading port and two side dumping ports. Dumping units are at Carbide's plants and would have to be installed by customers who hope to use the vans.

The palletizing operation is an arrangement of standard bagging and stacking equipment. Here a single operator can load up to eighteen 50-lb. bags/minute, while automatic equipment stacks the bags into 1-ton pallets.

The ships are converted T-2 tankers, revamped to hold both the bulk containers and some liquid cargo. The first to go into service, the *Carbide Seadrift*, will start shipments about mid-May. Another, the *Carbide Texas City*, will be converted for bulk hauling later this year. Meanwhile, Carbide's *R. E. Wilson* will maintain its regular movements to the Carteret terminal.

Back at Perth Amboy: The new unloading and distribution center marks Carbide's return to Perth Amboy. Almost 30 years after its Bakelite plastics plant moved to Bound Brook, Carbide bought a 108-acre site along the town's water front. So far, only 28 acres are being used for the terminal. When or how the remaining land will be used, Carbide doesn't say.

If the new bulk-handling system runs as smoothly as Carbide hopes, it may look to unloading more than plastics at Perth Amboy. Some observers feel that the new terminal could eventually take over much of Carbide's shipping in the New York-New Jersey area.

Whatever its future, the new operation marks a large-scale advance in bulk-plastics hauling that other companies are watching closely. Although there is no current move to follow Carbide's lead, any improvement in its competitive position could prod other firms into revamping their own distribution systems.

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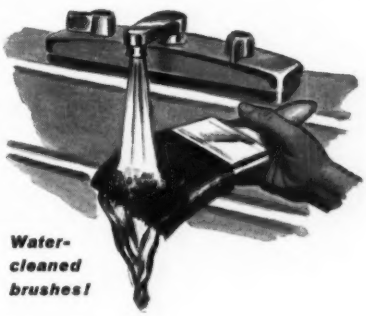

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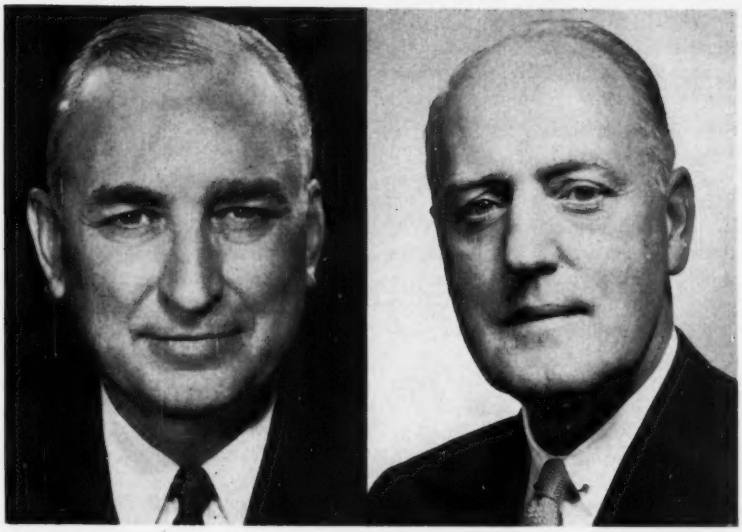

Firestone's Hathaway (left), Goodyear's Miles defend sales plan.

Getting Set to Take On FTC

All companies concerned plan court appeals against a new Federal Trade Commission order outlawing their contracts for the sale of auto tires, batteries and accessories (TBA). FTC claimed two big oil companies pressured their dealers into buying TBA items from certain tire makers.

The ruling isn't expected to affect the multimillion-dollar auto specialties (e.g., antifreeze, brake fluid, auto waxes and polishes, etc.) distribution setup. These products are marketed either directly by the specialties manufacturers to retail outlets or to big distributors who may or may not affix their own labels. TBA, while often thought to include a segment of this market, has been traditionally handled in a different manner. TBA suppliers, for example, do not belong to the Chemical Specialties Manufacturing Assn. (New York), although CSMA has an auto specialties division.

In separate decisions, FTC ruled illegal the agreements between Goodyear Tire & Rubber Co and Atlantic Refining Co., and Firestone Tire & Rubber Co. and Shell Oil Co. (It sent a third complaint, against B.F. Goodrich Co. and Texaco, Inc., back to a commission examiner, ruling there was not enough evidence to determine if the contract was anticompetitive.)

The decisions, written by outgoing FTC Chairman Earl W. Kintner, go beyond findings by Examiner Earl J. Kolb, who decided that Atlantic and Shell forced their dealers to stock TBA products from Goodyear and Firestone and had ruled this practice unlawful. Kolb, however, did not find that the contracts between the tire and oil companies were illegal, as did the full commission.

No Choice? Kintner criticized "override" contracts and their effects on service-station operators and on competition for TBA business. In the Goodyear-Atlantic opinion, he wrote, Atlantic has tried to make its dealers appear to be stoutly independent businessmen, "able to close up shop as an Atlantic lessee on Saturday night and reopen down the street in a Sinclair or an Esso station the following Monday morning." This, said Kintner, is a "romanticized picture of a small businessman who is, more often than not, in a woefully weak bargaining position vis-à-vis his oil company lessor."

Under the contracts, the rubber companies supplied TBA to oil companies and paid an "override" commission of 7½-10% to the oil concerns on TBA sales. Salesmen worked together to get service-station operators to stock only TBA covered by the agreement.

Error of Commission: FTC found

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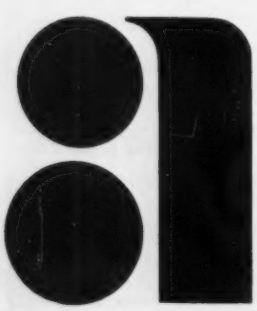
Melting Point...Decomposes when heated
Form...White crystalline solid
Solubility...Soluble in water, soluble in alcohol, insoluble in ether.



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that in one year Goodyear's sales through Atlantic outlets amounted to $5,700,121 and that Goodyear paid Atlantic a commission of $557,559. In the same year Firestone (which supplied TBA for Atlantic's Western sales region) sold $5,562,936 worth of goods through Atlantic stations and paid Atlantic a commission of $506,-199.

The commission also said that only selected tire dealers, nominated as "supply points," could stock service stations with TBA products. And it ruled this was an anticompetitive practice.

Kintner says the record of the cases "conclusively establishes" that sales commission contracts have "unlawfully injured competition in the distribution of TBA at the manufacturing, wholesale and retail levels." While the "more dramatic and immediate impact" is on retail dealers, " . . . from the point of view of the antitrust laws, it is the devastating competitive effects of the sales commission system on competitors of Firestone and Goodyear that raise the most grave questions."

Second Look: Goodyear, Firestone, Atlantic and Shell all tell CHEMICAL WEEK that they plan to appeal the FTC decision. W. F. Kenney, Shell vice-president and general counsel, says: "We do not believe that this latest decision by the FTC commissioners is a correct interpretation of the law. In late '59, the FTC trial examiner upheld the legality of our sales commission plan covering the sales of tires, batteries and accessories in service stations. This finding has now been overruled by the full commission. We plan to appeal it in the federal courts."

Goodyear Vice-President O. E. Miles states: "This is the first time that the sales commission plan, which is historical in the industry, has been held to be illegal, and represents new law on the subject. We intend to aggressively appeal the ruling." He observes that Goodyear was given "a clean bill of health" in the '59 FTC ruling.

Firestone's sales vice-president, Earl B. Hathaway, says that thousands of independent dealers both large and small serve as supply points under the sales commission plan; that outlawing of the plan will cripple the business of these merchants—and in many cases destroy it entirely.

LABOR

Allied Agreement: A two-year contract providing a 3% pay increase has been accepted by 880 hourly paid union employees at Allied Chemical Corp.'s National Aniline Division plant in Chesterfield County, Virginia. The contract raises the minimum pay from $1.86 to $1.92/hour, the maximum from $2.87 to $2.96/hour, and provides additional fringe benefits. It includes a wage-opener clause providing for new wage talks after one year. (Plant workers got a 4% raise last year under a similar clause.) Contract agreement came after more than a month of negotiations (and two hours before the old contract expired) between management and Local 13942, District 50, United Mine Workers Union.

KEY CHANGES

Donald M. Allison, Jr., to president, Vitro Electronics, division of Vitro Corp. of America (New York).

James W. Kettle to assistant general manager, Victor Chemical Works Division, Stauffer Chemical Co. (New York); **L. F. Cumming** to secretary and assistant controller; **P. S. Bedrossian** to assistant treasurer, Stauffer Chemical.

Werner H. Fischer to vice-president in charge of production and engineering; **Ralph H. Sayre Jr.** to director of engineering, Ciba Pharmaceutical Products Inc. (Summit, N.J.).

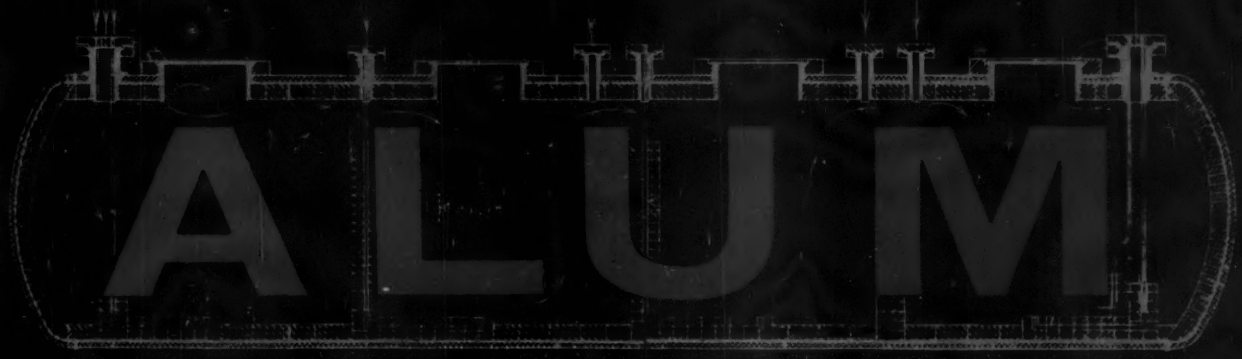
Walter C. Rueckel to vice-president, Wilputte Coke Oven Division, Allied Chemical Corp. (New York).

Lawrence A. McDonald to general sales manager, Arthur Colton Co. (Detroit), manufacturer of tableting, filling and packaging machines.

James B. Prendergast to executive vice-president, Allied Chemical's Barrett Division (New York).

Sidney A. Lippin to vice-president, L. B. Russell Chemicals (Long Island City, N.Y.), manufacturer of photographic, X-ray and graphic arts chemicals.

Walter E. Brewer to general sales manager, Industrial Division, Nopco Chemical Co. (Newark, N.J.).



A new process based on continuous autoclaving

This new process, developed and designed by Chemico, assures significant savings in the construction and operation of plants to produce liquid and solid ALUM. Using a horizontal autoclave for the pressure acid digestion of ore, normal three-day processing time is cut to three hours. In addition, the process can utilize a relatively coarse bauxite feed (plus 8 mesh), with further savings in equipment and operating costs. Efficient, compact package plants to produce as little as 3 tons per day of ALUM are available. Other single units to provide up to 120 tons per day can be provided.

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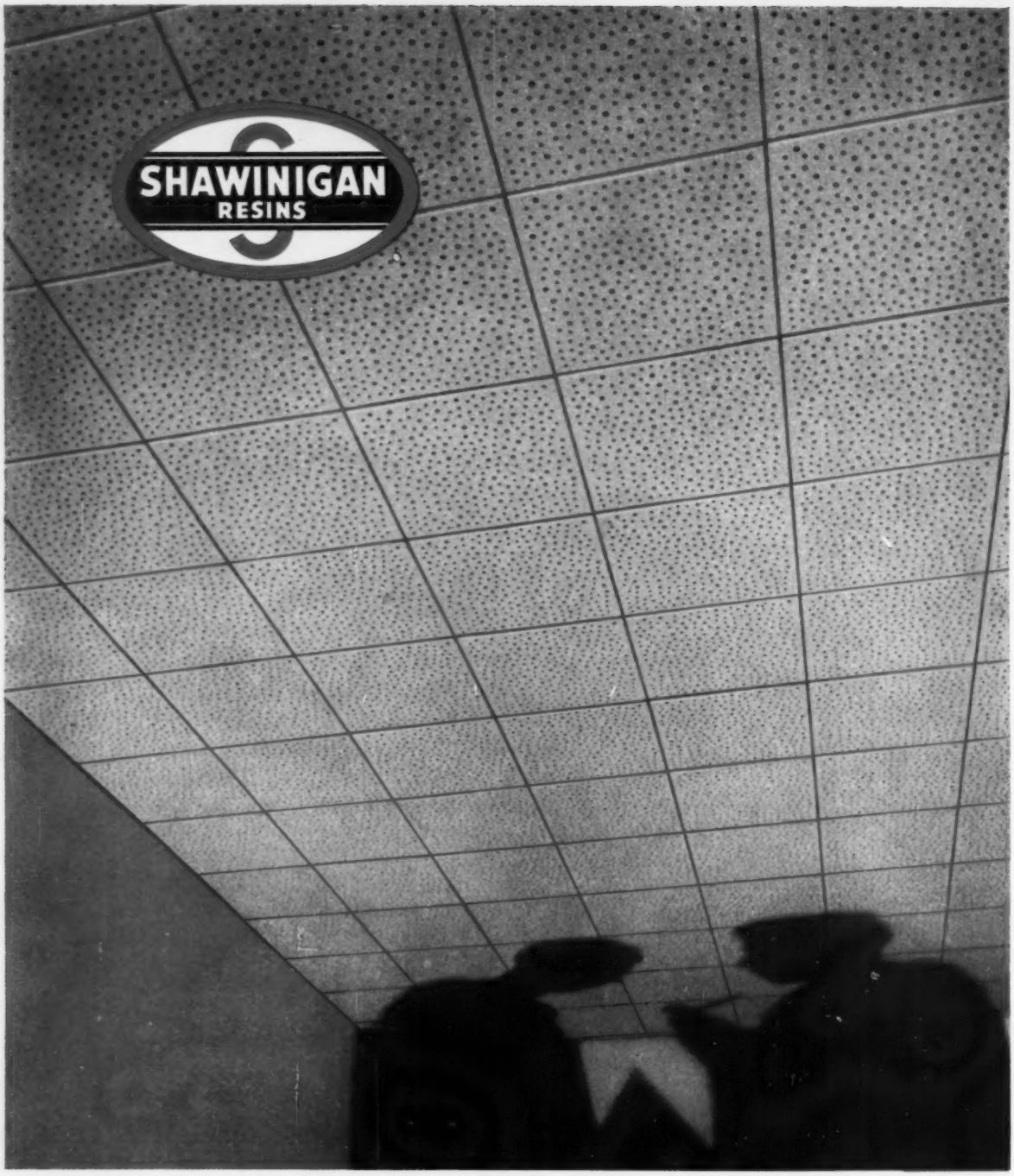

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Technology
Newsletter

CHEMICAL WEEK
April 1, 1961

New polymers, intermediates and drugs were among the features of the recently ended 10-day national meeting of the American Chemical Society in St. Louis (*CW Technology Newsletter, March 25*). Of top interest:

Polymers: disclosure by Union Carbide Corp. of work on nylon-7. Previously reported only by the Russians (Onanth fiber), nylon-7 was found by Carbide to have fiber properties rivaling those of nylons-6 and 6/6 (including higher melting and softening points). The company has also worked out an industrially feasible process for making the preferred monomer—ethyl 7-aminoheptanoate—from cyclohexane.

Other polymer developments included an Esso Research and Engineering process for sulfonating polymers without cross-linking them (key: complexing the sulfur trioxide with phosphates) and a Du Pont series of polyspirooxetanes having melting points up to 290 C.

Intermediates: trimethylene glycol (1,3-propanediol) made from acrolein is expected to increase the supply and cut the price of this material, now available only as a by-product of soap manufacture. Major use is expected to be in light-resistant, tough unsaturated polyesters, according to Shell Development Co., which is now synthesizing the diol in research quantities. Another resin intermediate is a new type of dibasic acid mixture developed by Pure Oil Co. It consists of petroleum-derived, alkyl-substituted carboxylic acids of double- and triple-ringed aromatics. The acid mixture can be used in making alkyd, unsaturated polyester, polyamine and modified epoxy resins.

Other news of intermediates includes Du Pont synthesis of a group of tetracyanocyclobutanes, and development at the U.S. Dept. of Agriculture's Eastern Regional Laboratories of a new, direct route to peroxy acids. An excess of 90-95% hydrogen peroxide reacted with the carboxylic acid in methanesulfonic acid solution for one to three hours at 30-40 C gives 85-97% yields of the peroxy acid.

Drugs: A combination of anti-inflammatory and analgesic properties in a single molecule has been accomplished at Wm. S. Merrell Co. by chemically linking benzal- or benzylfluorenes (antiinflammatory agents) with aryloxypropanolamines (analgesics). And Ciba Pharmaceutical Products is clinically testing a series of 18-ether derivatives of methyl reserpate as sedatives with low hypotensive activity. Two new muscle relaxants developed by Irwin, Neisler & Co. are also undergoing clinical trials. The two—2-(β-hydroxyphenethylamino)-pyrimidine and its β,β-diphenyl analog—were reported to have five times the potency of the used relaxant mephenesin now used.

Other highlights: a direct route from silica to alkyl silanes, by Dow Corning; thermal degradation of trichloroborazole to give pyrolitic

Technology
Newsletter
(Continued)

boron nitride, by Arthur D. Little, Inc.; use of ruthenium catalysts for easier hydrogenation of pyridines than with conventional Raney nickel, by Abbott Laboratories; and two new fungicides—5-chloro-4-phenyl-2-dithiol-3-one and the *p*-toluyl homolog—being field tested by Hercules Powder Co.

•

A continuous chemical process to produce metal powders from a wide variety of alloys and cermets (ceramic-metallic mixtures) has been developed by Curtiss-Wright Corp. (Quehanna, Pa.). Key to the process covered by U. S. Patent 2,893,859: chemical solvents tailored to dissolve the solid metal, then to be removed by flash-drying, leaving behind the metallic powder. The powders can be used for rolling and extruding. Typical powders produced include: Monel, Inconel and cermets such as tungsten carbide.

•

Commercialization of Canada's vast potash reserves took a big step closer to reality last week when International Minerals and Chemical Corp. finally completed shaft-sinking (to a depth of more than 3,000 ft.) at its mine near Esterhazy, Sask.

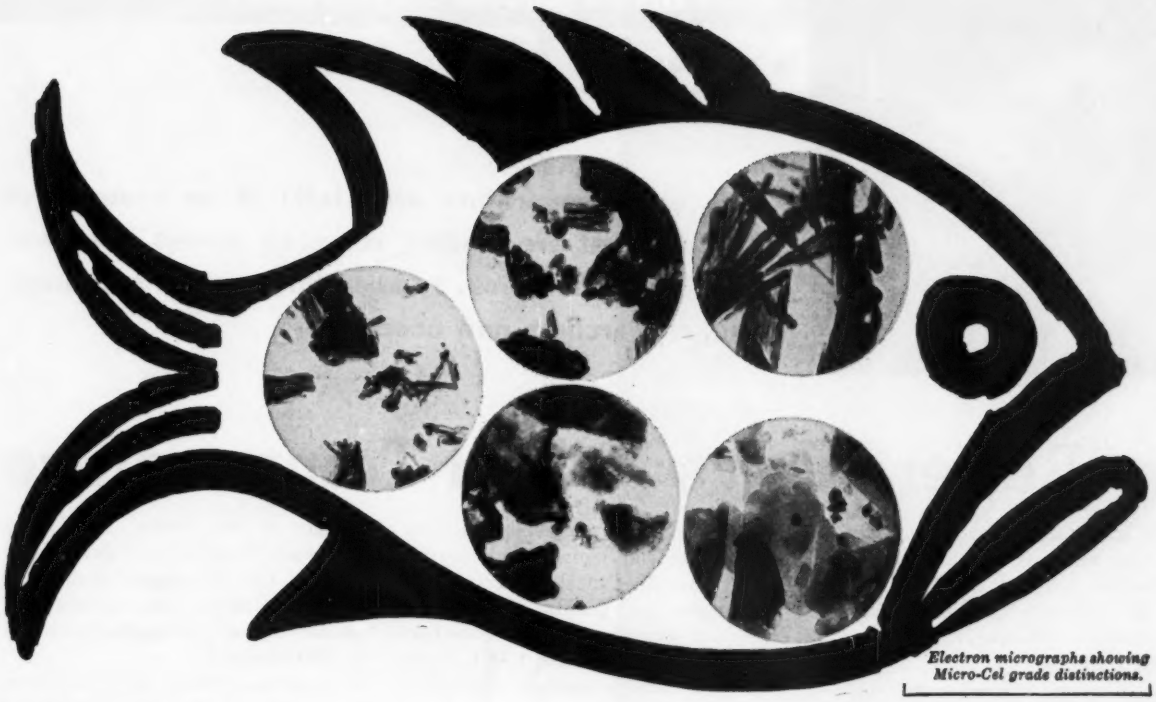
Because of fluid-bearing sand and clay layers at the 1,200-1,400-ft.-level, it was necessary to use an engineering technique new to the U.S., called "tubbing," to sink the shaft (*CW, Feb. 27, '60, p. 98*). By this method the fluid stratum was frozen with a mixture of lithium chloride at — 58 F. Freezing took nearly a year, after which workmen went through the frozen layers with pavement breakers, dropping cast-iron liners as they descended. The shaft is scheduled to be in full production by June 30, '62. A surface processing plant with 420,000-tons/year capacity is currently being completed, and another plant to double this capacity is planned.

•

Nuclear power can now compete with coal-fired power, according to General Electric Co. The firm says that a dual-cycle boiling-water reactor—which vaporizes water in the nuclear core and uses the resulting steam to drive generator turbines—will do the trick. Reason behind GE's claim: an improved core design that will permit building large (400,000-500,000 kw.) plants that are no larger than the 184,000-kw. plant designed by the firm at Dresden for Commonwealth Edison. GE says this and other lessons learned at Dresden would allow nuclear power stations designed today to operate at 6 to 6.6 mills/kwh. when they start up in'65. Investment costs for these plants would be reduced from an estimated $250 to $183/kw.

•

Boron flameproofing chemicals, applied either by brush or spray, have been successfully used in a test run with a Titan I rocket thrust chamber. Developed by Dyna-Therm Chemical Corp. (Culver City, Calif.) the coating, called Dyna-Therm D-65, protects metals by becoming intumescent (swollen) under excessive heat.



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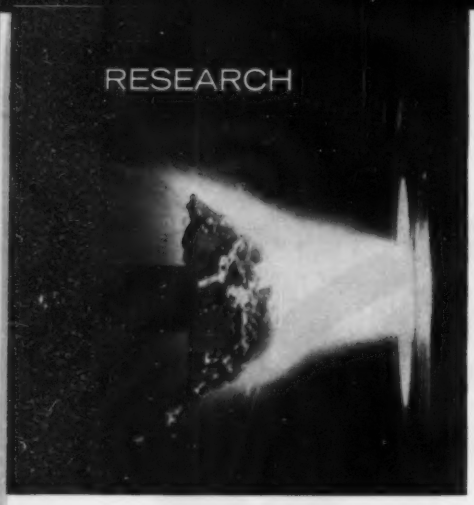


The high-temperature arc (left) is an example of devices that are leading research across new temperature boundaries. To keep this critical work moving, researchers now need . . .

Better Ways to Tell Temperature

Rapid advances in technology—at both the high and low ends of the temperature scale (*chart, p. 47*)—are creating a need for new and improved methods of temperature measurement and control.

Although techniques have been devised to measure temperatures from 0.001 K (almost absolute zero) to over 100,000 K, attaining accurate measurement at these extremes isn't easy. Moreover, measuring temperatures between the highest and lowest end of the scale is hampered by a lack of methods that combine precision with convenience.

Present accuracy limits of today's most-used instruments are in the neighborhood of 0.001 C for metallic resistance thermometers, 0.03 C for thermocouples and visual optical pyrometers. While these limits are acceptable for many uses, greater emphasis on strict temperature control of chemical processes is creating a demand for closer measuring techniques. And entirely new techniques are needed for measuring temperature at the extremes.

Accenting the New: Many of the new measuring methods — including germanium resistance thermometers for cryogenic use and special spectrographic techniques for plasma studies —came in for discussion this week at the fourth symposium on temperatures at Columbus, O. The session was cosponsored by the American Institute of Physics, Instrument Society of America and National Bureau of Standards. (Previous symposia were held in '19, '39 and '54.)

It was pointed out at the meeting that use of germanium and other semiconductors in resistance thermometers is prompted by their high resistivity, compared with metals. Thus they are more sensitive to slight temperature changes. The germanium thermometer (developed at Bell Telephone Laboratories) is useful from 1-35 K. However, it is highly sensitive to magnetic fields and requires more complex calculations, since the resistance-temperature relationship is not linear.

More Cryogenic Techniques: Several other techniques are used in the cryogenic range, depending on the closeness to absolute zero and the circumstances of the measurement. The platinum resistance thermometer is the standard measuring device from 630 C all the way down to 90 K (boiling point of oxygen), and is being proposed for standard use at lower temperatures.

Around 1 K, where the vapor pressure of helium becomes inconveniently low, helium-3 comes into use, gives vapor pressure measurements down to 0.3 K.

Paramagnetic materials are the key to the magnetic thermometer, capable of going as low as 0.001 K. The most commonly used materials are chromic methylammonium alum, cerous magnesium nitrate and zinc-diluted nickel fluosilicate. Other salts and some ethyl sulfates are also under study.

Top of the Scale: At the other end of the temperature scale are high-energy plasmas at over 100,000 K, levels existing in the atmospheres of many stars and in the sun's corona (over 1 million K). A variety of spectroscopic techniques is used in this range.

Microwave techniques and Stark broadening of special lines are two methods used, depending on electron density of the plasma. And X-ray spectroscopy can be used above 1 million K. Use of radiation at the electron cyclotron frequency has permitted studies of low-density plasmas at up to 500 million K.

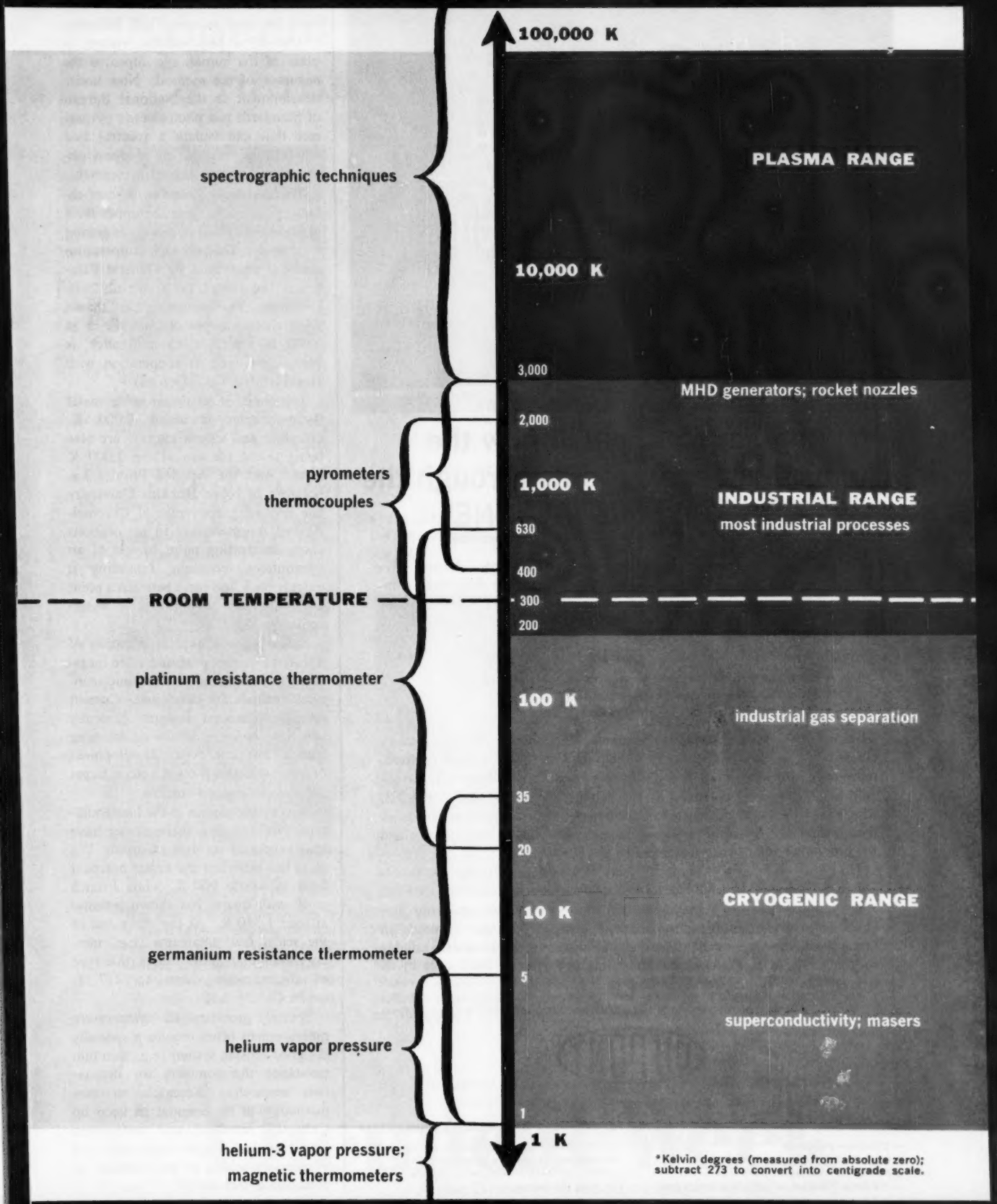
Lower-temperature plasmas down to about 3,000 K are of more interest (e.g., for magneto-hydrodynamic generators), however, and can be more accurately measured by spectroscopic means than can the high-energy plasmas. (Stark broadening measurements at 12,500 K have been estimated to have a 2% error.) But other methods are also possible at the lower levels.

For instance Avco Corp. (Wilmington, Mass.) has used changes in the velocity of sound to measure plasma jet temperatures of 3,500-8,000 K. And, at the same location, Avco has developed a tungsten resistance thermometer that it has used to measure the surface temperature of ablating silica (around 3,000 K).

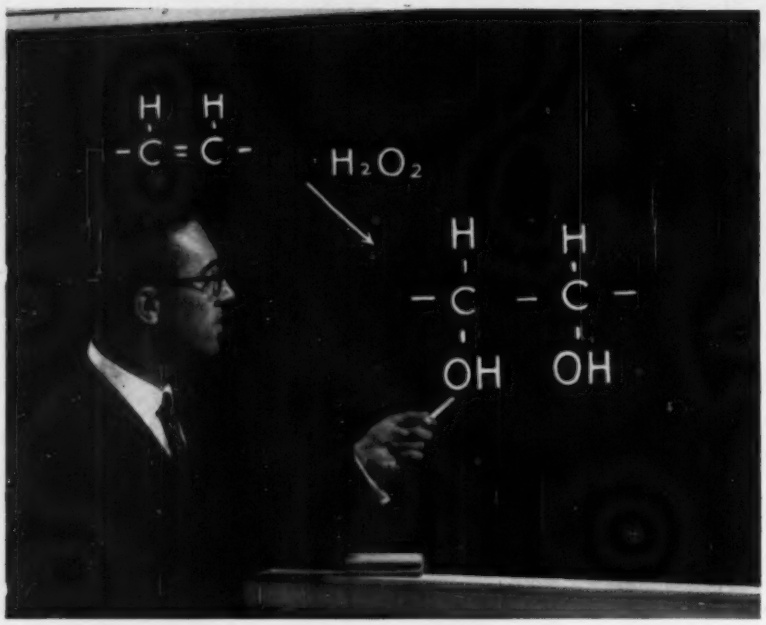
Commercial Limits: Various pyrometer systems are used for most of the hottest commercial applications. The range at which they are most accurate is about 1,000-1,750 K, with usefulness extending down to about 650 K and up to around 2,750 K. Special pyrometers are being developed for accuracy at lower temperatures (e.g., a lead sulfide cell unit with good accuracy at 373 K). And upper limits of 3,700-6,700 K can also be reached.

Main problem is to make sure that radiation measured is thermal and does not include the emissivity of the source. "Two-color" pyrometers that utilize the ratio between the intensities of two carefully chosen spectral lines

Temperature Measurement from Top to Bottom*



*Kelvin degrees (measured from absolute zero); subtract 273 to convert into centigrade scale.



Another example of how the chemical industry profits through the use of Du Pont "ALBONE"

(Hydrogen Peroxide)

The Du Pont technical representative above reviews how "Albone" hydrogen peroxide can be useful in a reaction to produce dihydroxy compounds from olefins. This service is an example of how Du Pont continues to delve into new uses for "Albone" and help customers use it efficiently and profitably.

Among the many profitable uses for Du Pont "Albone" are:

- **Epoxidation of soybean oil and tall oil esters**
- **Manufacture of organic peroxides**
- **Polymerization • Hydroxylation**

As pioneer producer of hydrogen peroxide, Du Pont has developed many efficient and economical processes to help industry use hydrogen peroxide more profitably. As part of this continuing program, Du Pont makes available licenses to operate under U. S. Patents 2,910,504* and 2,919,283, which are concerned with the preparation of peracetic acid and in situ epoxidation in the presence of cation exchange resins. These may be obtained for one dollar upon written request to Du Pont.

Du Pont will be glad to share its years of experience to help you profitably use "Albone". If you'd like to discuss possible uses, call your Du Pont representative. He can supply you with more information and your personal copy of Du Pont's new 142-page book, "Hydrogen Peroxide in Organic Chemistry". . . the most comprehensive reference work available on this subject. Du Pont, Electrochemicals Department, Peroxygen Products Division, Wilmington 98, Delaware.

*Basic patent issued to Du Pont, on peracetic acid-resin catalyst system.

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Make Du Pont your one reliable source for all these high-quality peroxides:

- **Calcium peroxide**
- **ALBONE® hydrogen peroxide**
- **PERONE hydrogen peroxide**
- **OXONE® monopersulfate compound**
- **PERDOX® sodium borate perhydrate**
- **Sodium perborate tetrahydrate**
- **SOLOZONE® sodium peroxide**
- **Zinc peroxide**

may be used to avoid this difficulty.

Use of a photoelectric system in place of the human eye improves the accuracy of the method. Now under development at the National Bureau of Standards is a photoelectric pyrometer that can isolate a spectral line one-fifth as wide as the sharpest observed in a visual optical pyrometer.

Thermocouple Progress: Use of refactory metals to raise the upper limit of thermocouple applicability is getting wide study. The best high-temperature material uncovered by General Electric is tungsten vs. tungsten with 26% rhenium. The material has shown good thermocouple characteristics at 3,000 K (emf. of 43 millivolts), is being developed in cooperation with Hoskins Mfg. Co. (Detroit).

Top limit of platinum-noble metal thermocouples is about 2,000 K. Graphite and silicon carbide are also being tested for use at the 2,000 K level. And the Applied Physics Laboratory of Johns Hopkins University has applied a conventional Chromel-Alumel thermocouple to applications above its melting point by use of an intermittent technique (shuttling it quickly back and forth between a point in a hot gas stream and a water-cooled jacket).

Other Approaches: Application of infrared cameras to temperature measurement is nearing, as electronic scanning methods are developed. Current optical-mechanical systems generally can have either accuracy or scanning speeds, but not both. Development of more sensitive films is a main target for the electronic scanners.

New developments in the household-type, liquid-in-glass thermometer have also expanded its uses. Corning 172 glass has extended the upper practical limit to nearly 900 K, while French work with quartz has shown promise at over 1,350 K. At the other end of the scale, new amalgams (e.g., mercury-thallium) allow use of this type of thermometer down to 217 K (—56 C).

Special problems in temperature measurement often require a specially designed sensing system (e.g., thin film resistance thermometers for detonation research). Research on new methods will be essential to keep up with the unsolved and unforeseen problems that plague researchers and engineers working at the frontiers of established technology.

"Nopacol 30-S"...What kind of a name is that for a girl?

That's my nickname. After all, what would you do if you were a baby chemical? Technically speaking, I'm known as a "polyoxyethylene-fatty derivative"... and who wants to answer to that?

I've got plenty of baby brothers and sisters with names just as funny as mine, too. Think of it... there were 496 brand-new chemicals born in the Chemical Process Industries last year.

What's more, the editors of CHEMICAL WEEK tell me that's the highest birth rate in the CPI market since '55. And we're being born now in 4 to 5 years instead of the old 7-year cycle.

They even published our names in a recent issue—complete with distinguishing characteristics, special abilities and family backgrounds. That's how important we are to CW's more than 46,000 all-paid subscribers.

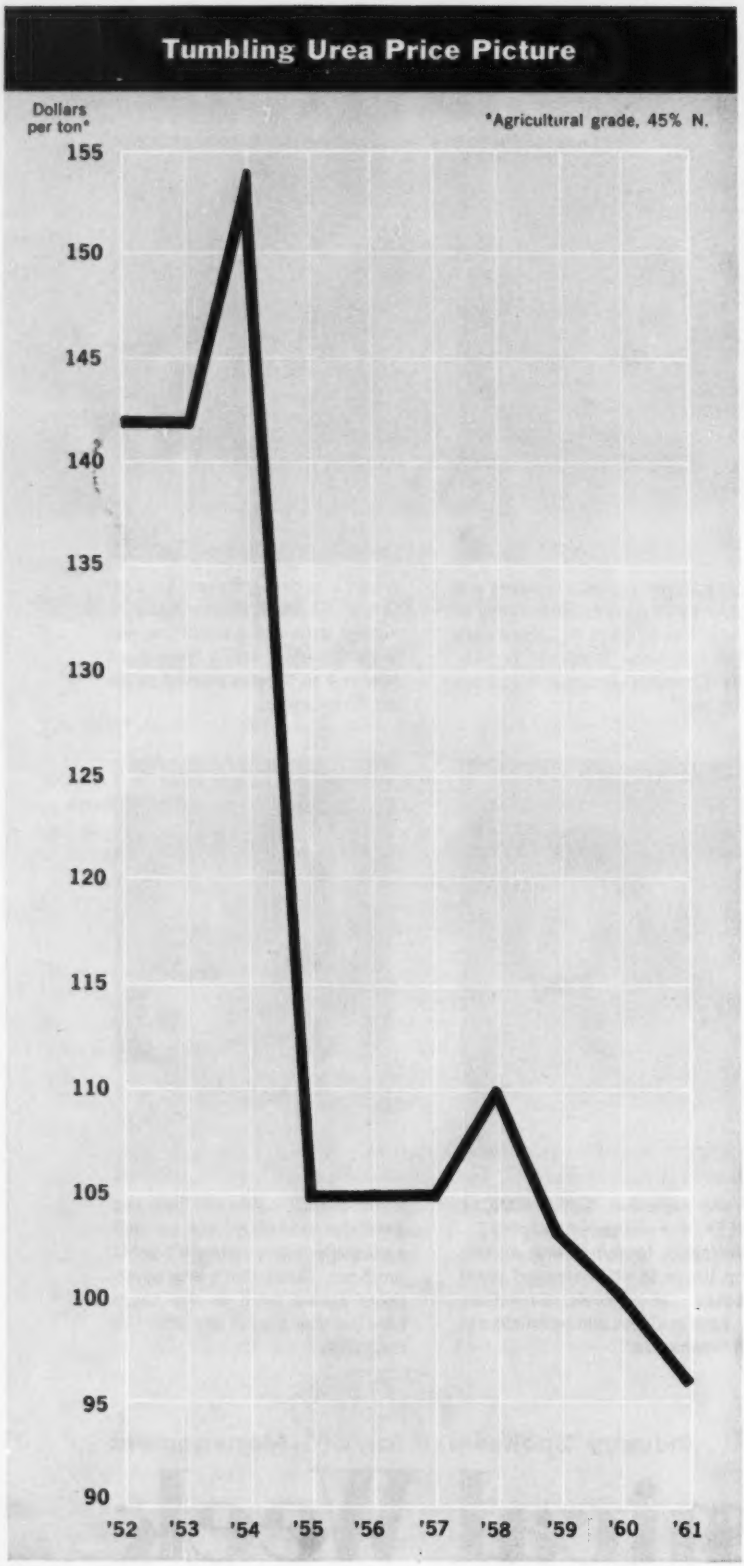
Pretty exclusive, that CHEMICAL WEEK. For management only... presidents to purchasing agents, top brass to shirt-sleeved plant bosses... all job levels, all functions ...both business and technical, but all "managers."

Really unique... alert and lively as a general newsweekly, but pointed exclusively to management's profit problems. Guess that's why advertisers placed more display pages here last year than in any other CPI magazine.

Industry Spokesman for CPI-Management

Chemical Week

A McGraw-Hill Businesspaper (ABC-ABP)



Low-Priced

Throughout the nation this month, producers of agricultural products are anticipating another record fertilizer year. In the nitrogen nutrient field, however, it will be a year of keen competition, created by the recent price cuts on urea.

The price change puts urea almost on even terms with ammonium nitrate, the other key nitrogen agent in fertilizers. Until this year, ammonium nitrate had a marked price edge. But last month, with the lowering of agricultural urea (45% N) tags to $96/ton,* bagged and freight equalized, this difference in price (based upon nitrogen content) was just about eliminated. Tags for ammonium nitrate (33.5% N) have not been changed, remain steady at $67/ton. Both quotes are f.o.b. plant.

Nitrogen Fertilizer Growth: Some inkling of the situation between urea and ammonium nitrate fertilizers that led to the recent price cuts can be gleaned from last year's production figures. While use of ammonium nitrate for fertilizer continued to grow, urea producers were hit with a major setback in the farm field, and little or no encouragement in industrial applications. Result: a drop-off in production.

Ammonium nitrate has long held the largest share of the fertilizer market, a situation the urea producers have tried hard to change. In '60, about 2.8 million tons of the nitrate went into fertilizer outlets. This was an increase of 7.5% over '59, and almost 1 million tons higher than the '55 figure.

Urea production meanwhile was off sharply, dropping almost 60,000 tons from '59's high, to about 570,000 tons in '60. And not all of this output was for fertilizer use.

Market observers point out, however, that the '60 production letup was not caused by a slowdown in consumption. Inventory buildup during the last part of '59, plus heavy demands for ammonia last year, forced a cutback in the amount of urea that was turned out last year.

* Other urea-grade prices: industrial $100/ton, feed $95/ton, for truckload or carload quantities, f. o. b. plant.

Urea Makes a Big Market Bid

No government figures are available on the breakdown of urea outlets, but the industry generally assigns about 65-70% of urea production to agricultural outlets, with the remainder divided equally between industrial and feed markets. In terms of tonnage this works out to about 370,000 tons for agriculture, and 100,000 tons each for industrial and feed uses.

Urea producers currently face a familiar chemical industry problem—overcapacity. Last year, the industry operated at about 65% of its output potential (based on an estimated capacity of about 900,000 tons). And, despite the more than ample supplies, more capacity is on the way; there are three new plants nearing completion: Mississippi Chemical's only urea operation, at Yazoo City, Miss., is almost in working order, should be in operation within the next two months. Sohio is installing its second unit, this one at Joplin, Mo. It is due onstream in the fall of '61. And Armour Chemical's first unit is now going up at Sheffield, Ala.

The combination of these factors, plus local price snipping and growing imports, has forced urea prices down.

Profit Squeeze: But lower prices may not be the full answer to the urea problems. In general, the cost of manufacture (per unit of nitrogen) is higher for urea than for ammonium nitrate. Thus it is not unlikely that a counter price cut in ammonium nitrate could be made.

However, several producers that make both ammonium nitrate and urea emphasized that the ammonium nitrate tags are not being touched now.

Under such circumstances, it's possible that urea could take away a part of the ammonium nitrate's fertilizer market. In fact, producers are this year looking forward to a sharp increase in demand for urea, and the brightest spot in the urea outlook will be in agricultural markets. They figure that about 650,000-700,000 tons (of agricultural, industrial, and feed grades) will be turned out.

This is predicated on urea and ammonium nitrate having comparable quotes based on nitrogen content, a situation in which urea appears attractive because it is a more concentrated material and offers savings in trucking, storing and application.

Industrial Dilemma: Industrial outlets for urea were soft in '60. Biggest markets are in urea-formaldehyde resins and plastics manufacturing. Last year, demand for plywood, one of the main outlets for urea-formaldehyde resins, was off sharply. How urea's industrial outlets fare in the next few years definitely depends to a large extent on what happens to plywood.

Plastics and other chemicals made from urea had a good year in '60 and will show moderate growth in '61. Thus the outlook for industrial urea markets will be for steady growth, if plywood need holds up.

The feed outlook is somewhat cloudy as other materials continue to fight for a share of the market. However, moderate growth is also expected in this area.

Import-Export Problems: Another area that has given some trouble to various producers is the import-export situation. Imports have grown steadily over the past few years as overseas urea capacity continues to mount. Both the East and the West coasts have felt the effects of these foreign expansions, and '60 was no exception. Imported urea tonnage climbed almost 20,000 tons to about 82,133 tons in '60, an increase of 33% over '59. Lower prices should help stem this growing tide.

Exports have remained fairly steady, ranging from 64,000-68,000 tons. Last year about 66,000 tons left the country. But one thing that is bothering some producers is the recently imposed Canadian tariff of 20% on the importation of industrial and feed-grade urea. This change has been put into effect, although Canadian urea (all grades) can still move into the U.S. duty-free.

As things now stand, urea production and demand should move up nicely in '61, although profits will likely be squeezed further. It all depends on the fertilizer market—if urea takes a big jump this year, ammonium nitrate producers are sure to fight back hard next year, so that any outstanding gains will probably be short-term ones.

U.S. Urea Capacity

Company	*Location*	*Tons/year*
Allied Chemical	La Platte, Neb.	110,000
	South Point, O.	110,000
Armour	Sheffield, Ala.	17,000
Cooperative Farm Chemical Assoc.	Lawrence, Kan.	17,000
John Deere	Pryor, Okla.	80,000
Du Pont	Belle, W. Va.	195,000
W. R. Grace	Memphis, Tenn.	110,000
Hercules	Hercules, Calif.	20,000
Mississippi Chem.	Yazoo City, Miss.	35,000
Monsanto	El Dorado, Ark.	35,000
Shell Chemical	Ventura, Calif.	40,000
Solar Nitrogen	Lima, O.	43,000
	Joplin, Mo.	52,000
Southern Nitrogen	Savannah, Ga.	10,000
Spencer Chemical	Vicksburg, Miss.	10,000
	Henderson, Ky.	30,000
SunOlin Chem.	N. Claymont, Del.	73,000

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Market Newsletter

CHEMICAL WEEK
April 1, 1961

Look for chemical inventory buildup to pick up steam soon, spur output in the coming months. Many producers have virtually stopped their sharp cutbacks, and some have begun to build stock levels in anticipation of climbing sales.

But inventory problems still plague chemical marketers. Although newer techniques and equipment have permitted them to operate with smaller stocks of raw material, customer insistence on speedy deliveries (often overnight) means a substantial supply of finished goods must be kept on hand.

•

Pilot-plant quantities of two new methacrylate chemicals are now available from Rohm & Haas. The new materials, 2-hydroxyethyl methacrylate (HEMA) and 2-hydroxypropyl methacrylate (HPMA), are expected to find outlets as functional group monomers in the production of copolymers and chemical intermediates. Biggest potential of the new materials is in the thermoset acrylic coatings field.

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The growing laundry and drycleaning markets are targets for two new items introduced this week by Armour & Co. (Chicago) and Du Pont. Armour's new Velva-Sour, a single finishing agent that is a combination laundry sour, fabric softener and bacteriostat for laundering diapers. It's used at the rate of 4 oz./100 lbs. of diapers, requires a treatment period of 4 minutes.

Du Pont's new drycleaning solvent, called Fasclene, is said to allow a safe, 15-minute cleaning period in coin-operated machines. That would be about one-third the time ordinarily required, could provide owners of newly developed coin-operated drycleaning establishments a big boost in daily machine capacity. Fasclene is based on a fluorocarbon. It will be sold through Du Pont drycleaning distributors throughout the country.

•

A demonstration of aerial application of fertilizer on steep pasture land is being held this week in the Fines Creek Community of Haywood County, North Carolina. The technique promises to open up new markets for fertilizer. In the demonstration, a high-analysis fertilizer mixture will be spread by airplane on a 400-acre tract that's too steep for mechanization or too costly to fertilize by hand. During the past several years, about 10,000 acres of pasture land in southwest Virginia, plus 200 acres in Watauga County, North Carolina, have been fertilized by this method. Results reported so far have been favorable.

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Selenium production, shipments and imports dipped sharply in '60, according to the Bureau of Mines. Production last year: 595,242 lbs.

(26% less than in '59); producers' shipments were 661,178 lbs. (down 35%) and year-end stocks were 273,111 lbs. (down 19%). Indications are that this downward trend may continue if no technological breakthrough is made in the near future. Both the chemical and rectifier uses of selenium have declined during the past year.

•

Price of hydroxyethyl cellulose has been slashed 10¢/lb. by Carbide Chemical Co., division of Union Carbide Corp. Hercules, only other domestic producer, has met the new price schedule: 74¢/lb. in quantities over 20,000 lbs.; 79¢/lb., 2,000 to 20,000 lbs.; 83¢/lb. in 150-2,000-lb. lots.

Carbide points to new production economies as the reason behind the price decrease. Trade observers point out that the company cut the price at a time when new HEC manufacturing facilities were being considered by Hercules; despite the news of the price cut Hercules has revealed plans to start construction of a new, "multimillion-dollar" hydroxyethyl cellulose plant at Hopewell, Va. Completion target date: first quarter of '62.

Markets for HEC have been growing rapidly during the past year in each of its major end-uses. Its most important gains have been as a thickener and film former for emulsion coatings. Its other uses—as a textile sizing agent, ceramic binder, etc.—have also been growing.

•

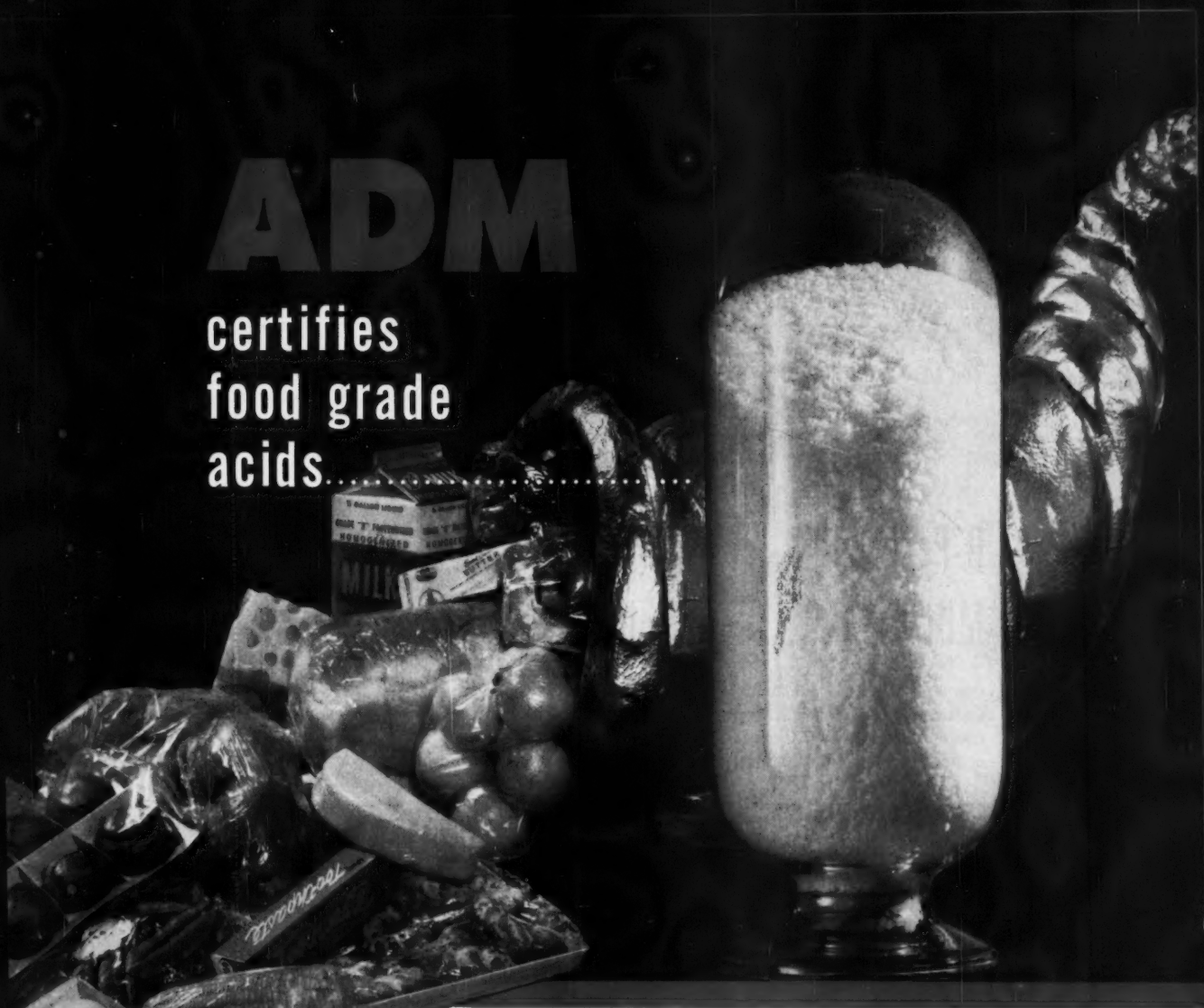
Production of natural gas liquids (NGL) has now reached 1 million bbls./day, boosted by rising demand from fuel and chemical markets. Ethane from NGL is expected to reach 23,150 million cu.ft./day in '61 and almost double in '62 to 46,200 mcf./day (usage was 17,650 mcf./day in '57).

The obvious trend in the petroleum industry, according to speakers last week at the Dallas meeting of the Natural Gasoline Assn. of America, is to recover more of the ethane available in the NGL stream. Probably because of its relatively stable price and consistent demand (without seasonal fluctuations). The older units are able to recover about 20% of the ethane available in natural gas liquid. Some recent installations can pull out about 50%, and projects under consideration will be able to recover 60%.

SELECTED PRICE CHANGES—WEEK ENDING MARCH 27, 1961

	Change	New Price
UP		
Oleic acid, dbl.-dist., tanks	$0.0075	$0.165
Quinidine sulfate, USP, oz.	0.04	0.785
Soybean oil, crude, tanks	0.00375	0.13125
Tallow acids, dist., tanks	0.0075	0.1125
DOWN		
Dodecyl benzene, tanks	$0.005	$0.11
Tung oil, dms.	0.0075	0.29

All prices per pound unless quantity is quoted.



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Fatty acids and tri-glycerides that comply with Food and Drug Administration "food grade" regulations are available from ADM. These quality products are made from edible grade materials, including tallow. We certify that all will pass the Chick Edema factor test as specified by FDA.

These food grade acids are specially made for preparing food additives, packaging materials, and other items that come into contact with food: mono and di-glycerides, methyl, ethyl, and glycerol esters, such as sorbitan, sucrose and lactose. They are also useful for preparation of fatty acid salts for lubricants used in the manufacture of foods.

Count on ADM to keep abreast of any new requirements or changes in FDA rulings. Meanwhile, write, wire or call us for product samples and full information on any of these food grade products:

HYDROFOL ACID 1410 FG
Tallow-derived stearic acid of exceptionally light, heat-stable color and low iodine value.

HYDROFOL ACID 1420 FG
A palmitic-stearic acid blend . . . ideal replacement for double or triple-pressed stearic acid. Useful where heat and chemical stability, and resistance to oxidation and color change are critical.

HYDROFOL ACID 1150 FG
High stearic acid content and high melting point make it suitable for grinding into powder. Stable against light, heat, oxidation and decomposition.

HYDROFOL GLYCERIDE 1057 FG
Hydrogenated tallow tri-glycerides. Useful where firmer, more uniform edible grade material than tallow is needed and where color and low free fatty acid content are important.

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FOR ECONOMICAL SEPARATION OF FILTERABLE SOLIDS

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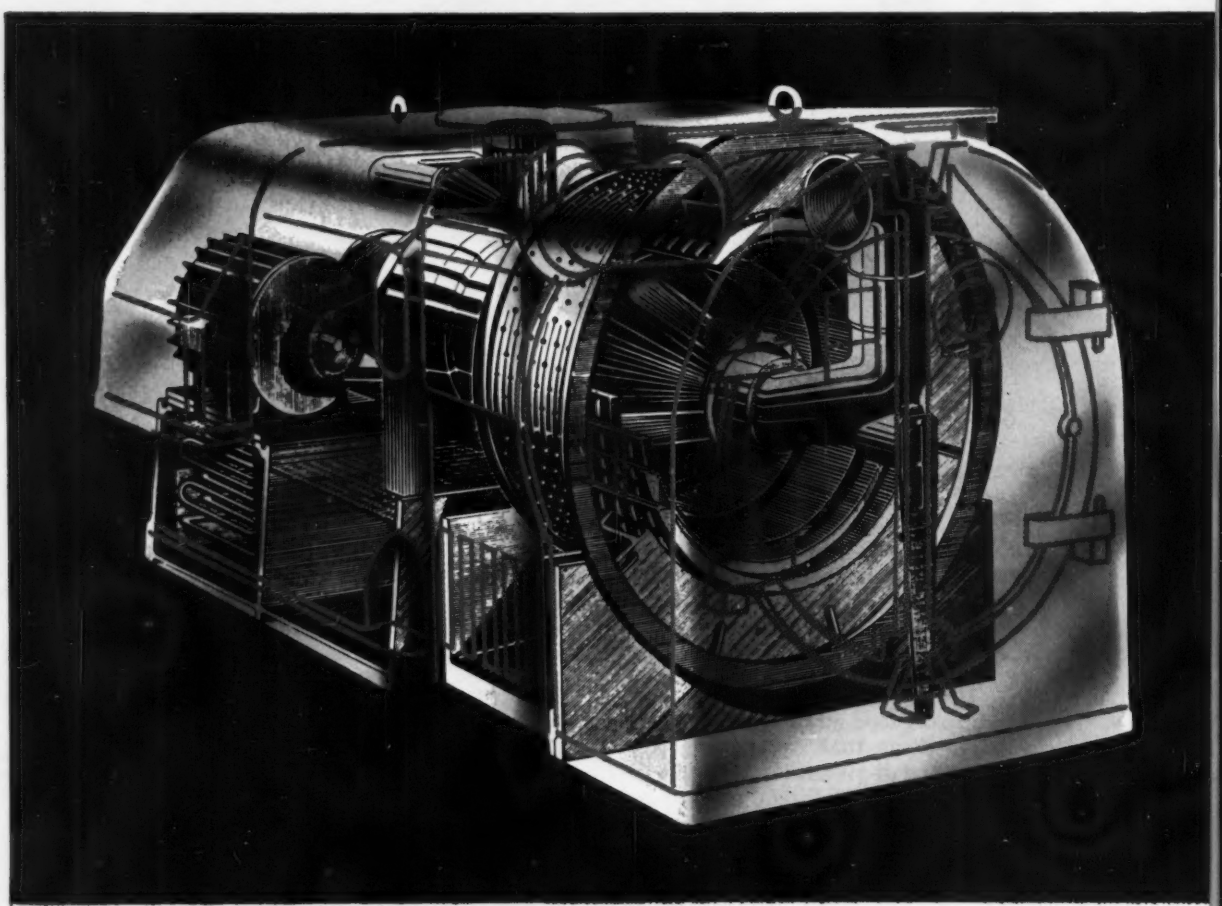
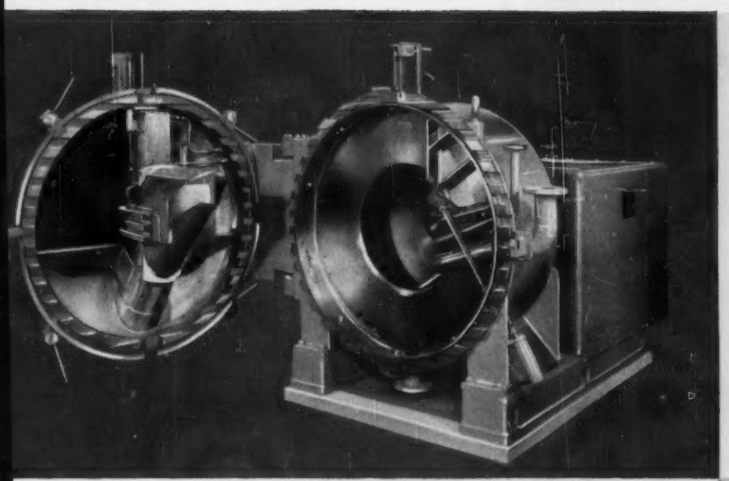
B-P (ESCHER-WYSS) MULTI-STAGE CENTRIFUGALS

Continuous centrifugation of difficult-to-handle materials is now possible with new B-P (Escher-Wyss) Multi-Stage Continuous Centrifugals. The continuous multi-stage pusher centrifugal eliminates cake buckling, assures adequate retention time, speeds release of liquids, improves washing, provides better separation of multiple liquid components and reduces power consumption. Models are available with capacities from 1½ tons to 45 tons per hour.



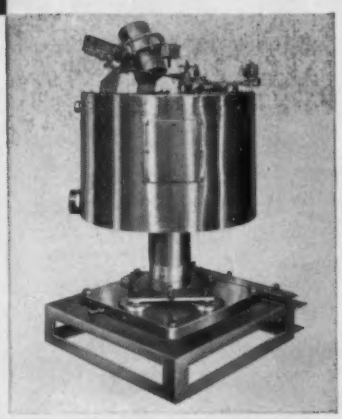


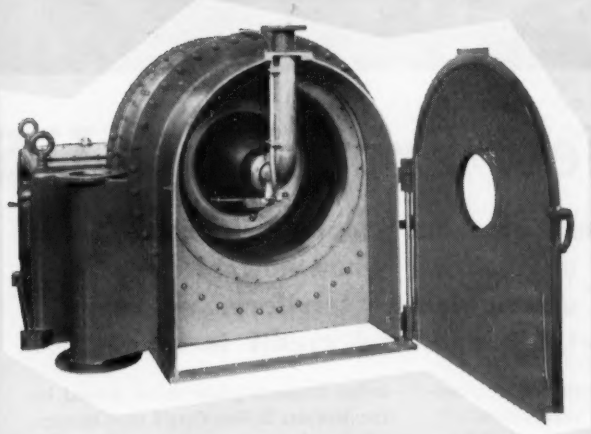
PRESSURE CENTRIFUGALS

The B-P HS 40W is one of a line of pressure centrifugals built for normal operation at 1000 times gravity and pressures up to 150 PSIG. Many new features include: a self-seating, self-aligning door seal, housings that withstand extreme operating pressures, new type discharge knife and chute, and a peeler knife that enters the cake at successively increasing depths, thus eliminating cake glazing.

VERTICAL CENTRIFUGALS

The new Baker Perkins VS-20 Vertical Centrifugal is designed and built to handle friable crystals during charging without danger of crystal degradation. The unit is charged with slurries while running at reduced speeds, then automatically accelerates for the drying and washing operations and automatically decelerates for discharge.





CONTINUOUS CENTRIFUGALS

The B-P Type S Centrifugal has continuous feed and discharge requiring no timing or cycle controllers. It is ideal for centrifuging a wide range of relatively free-draining crystalline materials. Friable solids are handled easily since there are no scrapers, baffles, rakes or plows to cause crystal degradation. Models are available with capacities up to 54 tons per hour of solids.

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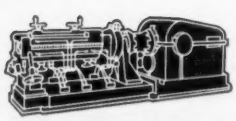
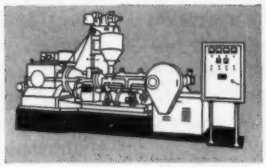
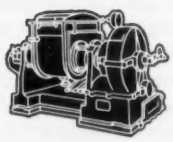
BAKER PERKINS INC.







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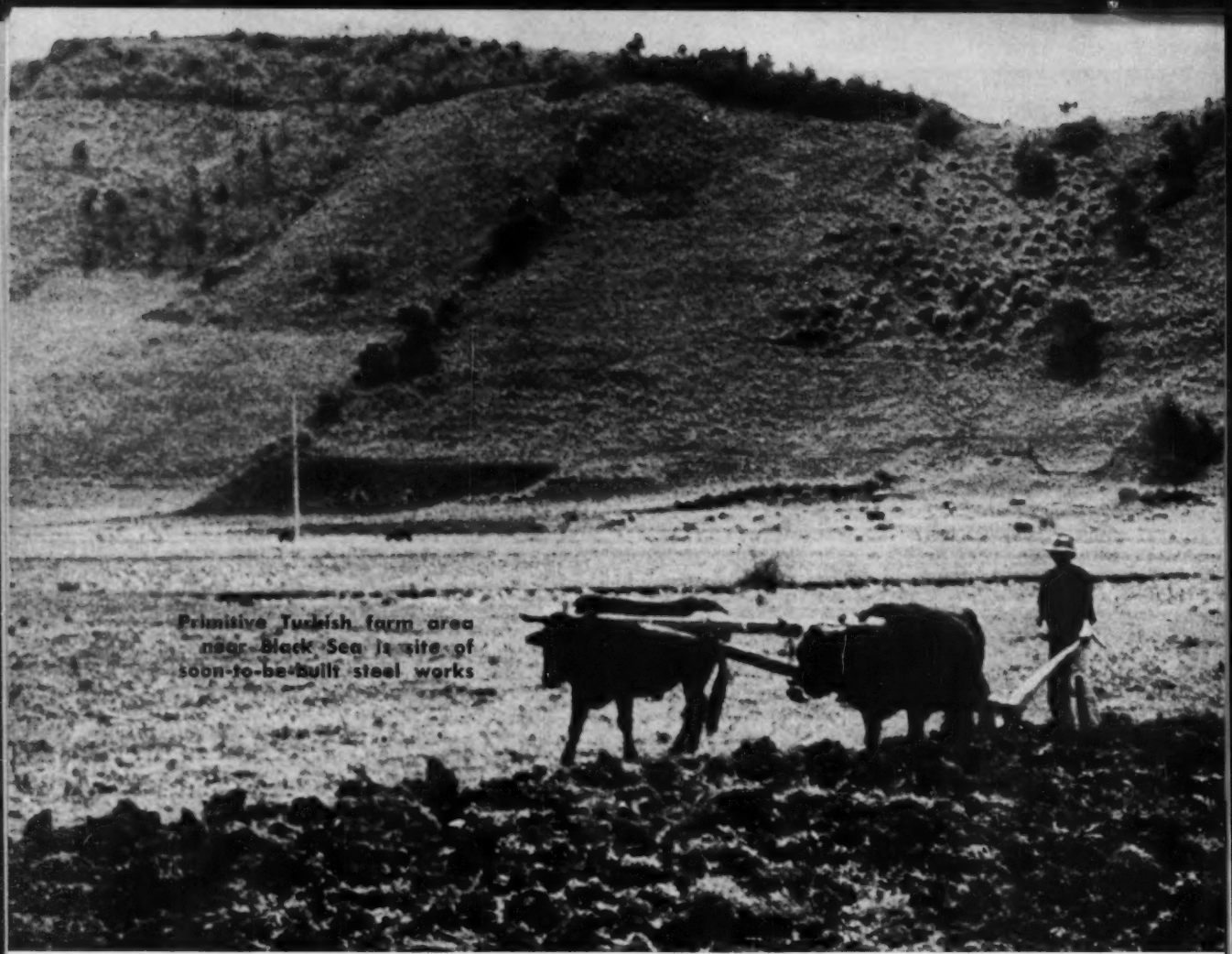


Primitive Turkish farm area near Black Sea is site of soon-to-be-built steel works

Opening Fertile New Frontier to U.S.

The underdeveloped nations hold out great challenges—and greater rewards—to U.S. engineering know-how. Here's how to do business in this unaccustomed territory, where competition takes a back seat to need, and credit is king.

This week representatives of Koppers Associates are negotiating with some 30,000 Turkish truck farmers to buy up the 900-acre site for the $245-million Eregli Iron and Steel Works.

Blaw-Knox Co. (Pittsburgh) expects soon to start detailed engineering design work on a Korean chemical plant—as soon as representatives of the Puk Sam Chemical Industrial Co., Ltd. negotiate the final contract for the plant through the Development Loan Fund. This plant will produce about 1,800 tons/year of polyvinyl chloride copolymer and 1,320 tons/-year of caustic soda. Besides process and engineering designs, Blaw-Knox will provide procurement services, construction and startup supervision.

Chemical Construction Co. (New York) is beginning detailed engineering design for a $58-million fertilizer plant to be built at Trombay, India. Just last week Chemico completed final negotiations for this contract with Hindustan Chemicals and Fertilizer, Ltd., a government-sponsored corporation. When completed, this plant will produce 300 tons/day of ammonia, 350 tons/day of urea (using Chemico's new process), as well as nitric acid and nitro phosphate.

Chemtex, Inc. (New York) is pushing ahead on the final design of a nylon filament plant to be owned by the Korean Nylon Co., Ltd. Chemtex officials just returned from Korea a few weeks ago, after signing the final contract. This plant, which is partly financed by a $3.2-million loan from the Development Loan Fund, will turn out approximately 2 million lbs./year of nylon yarn. It is expected to save Korea $2 million/year in foreign exchange.

Significance of these projects is pointed up by some statistics: In '60 over 15% of the total process plants contracted by or for U.S. firms were foreign. And a McGraw-Hill survey shows that independent U.S. manu-

Imports Grow with Industrialization

Per-capita imports from the U.S.

Burma	30¢
Nigeria	56¢
Indonesia	71¢
India	83¢
Pakistan	$1.03
Japan	$10
Germany	$14
United Kingdom	$17
Belgium	$35
Netherlands	$46
Canada	$245

Know-How

facturing companies planned foreign spending of $888 million in '60. This amount of capital investment, added to domestic spending, is enough to spell boom to engineers and equipment makers.

Only a fraction of the capital spending in less developed areas today is going to the firms on the basis of lowest price. Because companies and government agencies in underdeveloped areas rarely have strong technical staffs, conventional U.S. bidding methods are meaningless. Why talk about competitive prices when there is no product? Or talk about efficiency when the difference between producing or not producing looks like an efficiency of 100%?

Here, the U.S. engineer finds himself in a new type of competition. Emphasis has shifted from prices to need. Who needs what type of plant? Find him, be his consultant, treat him fairly, and he will make a long-lasting, profitable customer.

Route to Foreign Projects: Alert U.S. firms have already spotted this trend and are busy developing new overseas contracts under these conditions. Already, there has evolved a standard pattern which most projects resemble, although individual cases may vary in detail. As outlined by J. W. Pike, vice-president of Struthers Wells International Corp., this standard procedure involves four basic steps: (1) financial feasibility study, (2) technical feasibility study, (3) credit negotiations, (4) final authorization.

Financial Feasibility: Before any area can be considered for a project, its investment potential must be evaluated. Aspects to be considered include: physical characteristics such as geography, climate; government structure, government role in business; laws and their administration; labor; extent of industrialization; available natural resources, fuels and power; service industries for manufacture and construction; transportation and communication; marketing facilities; and the types of business organizations prevalent.

A very large part of this information can be had readily at little or no cost through the U.S. Dept. of Commerce's Bureau of Foreign Commerce (BFC).

Most popular of the BFC's services are its trade missions, consisting of businessmen who volunteer to visit a foreign country and investigate its possibilities for investment. Trade missions planned for the first half of '61 will visit Ceylon-Malaya-Singapore, Colombia, Australia, the southern Caribbean, Japan, West Africa, Germany, and Finland.

Technical Feasibility: This is typically an engineering estimate. It will specify feedstocks, products, utilities; propose an approximate layout for site evaluation; list the mechanical equipment along with its specifications and include flow diagrams with piping, valves, etc. Some detailed drawings may also be included, depending on the peculiarities of the project. Such a study will cost $25,000-$250,000.

This item highlights the only rule universally practiced by experienced firms: charge for it. Since the engineering firm stands to invest years of executive-caliber time and hundreds of thousands of dollars in following the project, it must be sure that the local group is similarly committed. The local group, moreover, acquires a feasibility study if it loses confidence in the original firm. It owns the study and can offer the project to another company.

Credit Negotiations: International competition for construction projects is keen. And credit, backed by governments, has emerged as the essential sales tool. Local entrepreneurs, which look to engineering firms for technical advice, now look to them for financial assistance too. If the engineering firm's government offers credit, it stands a much better chance of pushing its contract to fruition.

France is reported to be the leading lender, outstripping the U.S. in the per-capita quantity of money going to less developed countries; Italy has already loaned $50 million to the United Arab Republic and, in January, it had a trade mission in Cairo studying possibilities of extending these loans for the construction of chemical process plants. England has been working with the Argentinians—last August it sent a trade mission to Argentina, which reported that credit is the key prerequisite for selling British equipment to Argentina.

Credit arrangements can be divided into three general classes depending on whether the new project is considered: (1) basic utility (electrical power, gas pipelines, docking facilities, etc.), (2) basic industry (fertilizer plants, basic chemicals, steel mills, etc.), or (3) secondary industry (petrochemicals, plastics manufacturing, etc.).

Basic utility projects and a large part of the basic industry projects are handled in the U.S. either by a single large company (International General Electric, International Westinghouse, Kaiser Aluminum, etc.) or by a consortium. The Eregli Steel Works is an example of such a consortium. In contrast with these, most secondary industry projects, along with basic industry projects where the local group has sufficient capital, are usually handled by negotiated contracts. These show more variation than the consortium.

The Consortium: Most consortiums

Case History: The Eregli

The following testimony is extracted from testimony before the Senate Foreign Relations Committee—which was evaluating foreign aid—recorded in the April 4, '60, Congressional Record.

"My name is Fred C. Foy. I am chairman and president of Koppers Co., Inc., Pittsburgh, Pa.

"In November of 1958, Koppers was commissioned by the Turkish government to make a survey of the economic and technical possibilities for a second integrated steel mill in Turkey. After a thorough study of all technical, financial, market and raw-material factors, a report was submitted to the Turkish government on Sept. 1, 1959."

[The Turks discussed a loan for the plant with the U.S. Development Loan Fund, which suggested that the plant should be privately, rather than government, owned.] "After further consideration the Turkish Prime Minister and his associates agreed that a private-enterprise approach to this second steel mill might well have many values to the Turkish economy; and they advised DLF they would [try to] see how one might be developed.

"While the Turkish officials were in Washington, Koppers' representatives met with them to discuss the project. Koppers was later joined by representatives of Westinghouse Electric International Co. and Blaw-Knox Co.

"These discussions culminated in the signing of a letter of intent on Nov. 11, 1959, in which the Turkish government agreed to award to Koppers, Westinghouse and Blaw-Knox a contract for engineering, procurement, construction and supervision and certain equipment for the new plant. As part of their responsibility under this letter of intent, the three U.S. suppliers agreed to work with the government of Turkey to work out a plan for a corporate structure and financing for the project. It was agreed that this plant would include not only the Turkish private and public sector, but also private investors from the United States. The three U.S. suppliers agreed further to take a substantial equity interest in the new company when formed.

"Representatives of Koppers, Westinghouse and Blaw-Knox proceeded to Ankara, Turkey, arriving on Nov. 22, 1959. After a week of meetings, a protocol was signed on Nov. 29 which formalized the letter of intent, establishing that Koppers, Westinghouse and Blaw-Knox would provide at least $10 million of equity capital in kind, and establishing the general rules for the formation of the new steel company (Eregli Iron and Steel Works).

"A representative of the Chase International Investment Corp. accompanied the American group to investigate the possibility of private investment by Chase and by other private

consist of four parts: (1) an engineering company which does the technical feasibility study, prepares the engineering design, and supervises construction, (2) an equipment company which fabricates major types of equipment like compressors, steam boilers, evaporators, etc., (3) an operating company which shares management and operating responsibilities after the plant is started up, and (4) the indigenous firm which provides know-how and skills in dealing with local labor, local laws, communications, securing government approval, etc.

When applied to projects in the chemical process industries the consortium organization nearly always takes on an important nuance. In contrast with steel plants, power stations, etc., process plants rarely have enough of one given type of equipment to interest a single manufacturer. As a result, the consortium is usually worked out in the *chef de group* system. Here, a manufacturer of the major equipment will become a member of the consortium and this firm will then assume responsibility for all equipment related to its own product, subcontracting to other equipment manufacturers and charging a fee for its procurement services.

A critical question faced by consortium members is whether or not they will take an equity interest in the new company. Most U.S. engineering companies object to this. They say equity participation makes them competitors of their best U.S. customers and, in addition, they don't have enough money. Even some of the larger operating companies say they can't afford to tie up funds as equity in a number of projects.

On the other hand, equity participation is frequently the deciding factor in securing the contract. It establishes, first of all, a bond of confidence and mutual cooperation between the local group and the American firms. And American firms, acting both as consultants and suppliers, hold an unbalanced authority over technical decisions. One of the best ways to assure that they will make these decisions in the interest of the new project is to see that they have a financial interest in its success. This point of view seems to prevail in the government lending agencies, which move relatively rapid in approving loans for projects in which U.S. firms hold a substantial equity. The consensus among experienced firms is that optimum equity for Americans should be 10-15%.

Negotiated Contracts: When the American firms do not take a part ownership in the proposed plant, the project is usually handled through a negotiated contract to an engineering company. The Puk Sam polyvinyl chloride plant by Blaw-Knox, H.C.&F.'s fertilizer plant by Chemico, and Korea Nylon's yarn plant by Chemtex are all examples of this. "Negotiating" such contracts generally means deciding the nature of the services.

For overseas projects a host of unconventional details have to be decided: Will the engineering firm train local draftsmen and use them for the detailed design work? How many men will it send for construction supervision? How many startup operators will it provide? Can it organize an operator's training school?

Statistics show why these contracts are usually handled by engineering firms. Engineering costs for a typical process plant run to about 10% of materials cost, with the engineer's fee

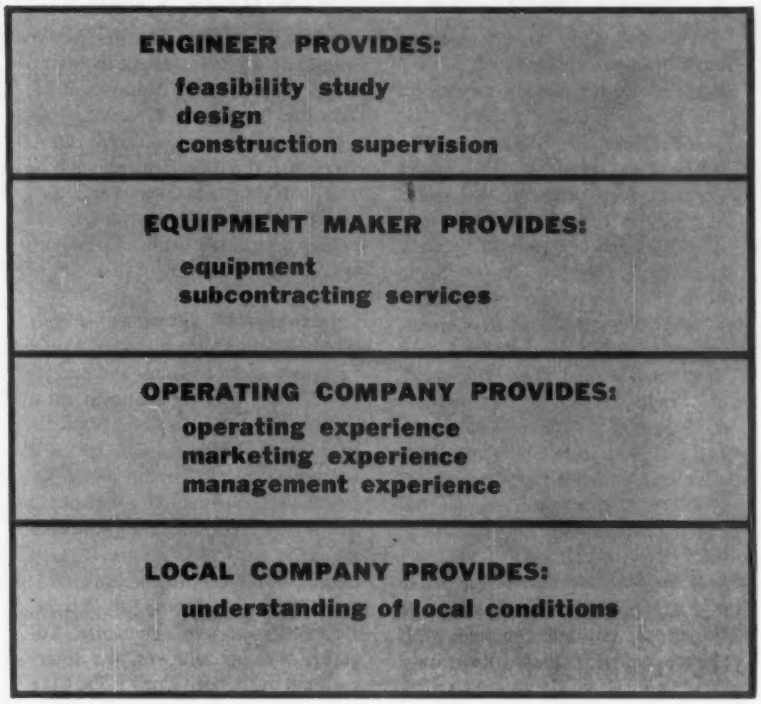
Iron and Steel Works

investors in the United States.

"On Jan. 5, 1960, the Turkish officials notified the Development Loan Fund and the American group that the protocol had been ratified by their government.

"It is contemplated that the total equity capital will be $51,250,000 of which the Turkish public sector will subscribe $24,000,000, the Turkish private sector $11,000,000, and the U.S. private sector $16,250,000 (when all debentures and warrants are converted into common stock) . . . "

[Bringing this testimony up to date, the works will cost about $245 million of which $129.6 is from a DLF loan, $59 million comes from equity financing (15% put up by Koppers, Blaw-Knox and Westinghouse, the rest from the Turkish government and private investors), $21 million from a Turkish government loan and $25 million from European sources and Chase International Investment.]



adding 10%. Thus, materials cost five times as much as the total cost of engineering designs, mechanical specifications for equipment, procurement and analysis of manufacturer's bids leading to the recommendation of a successful bidder. So, for a relatively small portion of total costs the overseas client obtains control of all spending.

In contracts of this sort, the engineering firm will be the only supplier that does not contend through competitive bidding. It provides the technical sophistication to carry out for its client the complicated materials bid solicitations and analyses.

Guaranteed Credit: With negotiated contracts, guaranteed credit or credit insurance becomes highly important. The National Contractor's Assn. has stated that the lack of adequate credit guarantees by the U.S. government costs U.S. equipment manufacturers millions of dollars in sales annually.

Here's how it works: When an operating company builds a new plant, it signs a separate contract for each major item of equipment, whether its plant is in the U.S. or in a less developed country or anywhere. Standard terms of payment for this item of equipment state that the first 5% be paid when the contract is signed, a second 5% when the certified construction drawings are turned over to the engineering firm, and a third 5% when the item is delivered. At this time, the purchaser hands over to the equipment manufacturer a bundle of notes listing payments due at regular intervals until the balance is achieved.

Normally, these payments stretch out over several years, and the average equipment manufacturer can hardly afford to keep them outstanding on his books. He will turn them over to a bank, which buys them at a standard, published discount. This is when guaranteed credit comes into play.

In the U.S. the credit of the purchaser will have been established before the equipment manufacturer ever concludes the sale; with less developed countries, this credit must be arranged through international or government lending agencies. If the local entrepreneur has acquired a loan, all is fine. The lending agency backs the notes payable for the equipment, and credit is insured 100%. When the lending agency is part of government, contracts usually stipulate that equipment be bought from the lending country.

However, these credit agencies, whether private or governmental, want to be sure of a project's commercial possibilities before they will loan money. They ask for part-ownership commitments on the part of the U.S. firms involved, review the financial and technical feasibility studies and try to forecast the possibilities of the proposed plant.

These studies, taking upwards of six months for processing, work fine for utilities and large basic industry projects for which there is little competition; but they usually collapse in the face of the stepped-up competition of secondary industry—even in less developed countries.

Although they serve the real needs of a less developed country, plants for plastics, petrochemicals, metal fabricating, etc., must face pay-out periods that shrink toward five years; they must meet the commercial risks of competing plants and substituted products. Under these conditions conventional lending methods become too cumbersome and industrial expansion loses its impetus, except for those areas

Federal Agencies Aid Overseas Projects

The following seven agencies have been set up by the U.S. government to aid foreign private investment.

U.S. Dept. of Commerce: This is the focal point in government agencies for Americans interested in overseas investment. The Dept. of Commerce serves as an official information clearing house. Some of its administrative offices include: The Office of Business Economics, which compiles data on long- and short-term capital flow; The Office of Trade Promotion; The Office of Economic Affairs; The International Resources Staff; and Business and Defense Services. Headquarters address: 14th Street between Constitution Avenue and E Street NW, Washington, D.C.

Export-Import Bank: The policy of Eximbank is to supplement and encourage, but not compete, with private capital. It makes loans only when it's satisfied that private interests cannot raise funds on reasonable terms. Dollar repayment is required on its dollar loans. Address: 811 Vermont Ave. NW, Washington, D.C.

Development Loan Fund: This group provides capital for specific projects and programs that contribute to economic growth of less developed Western countries. It's unique because (in certain cases) it may accept repayments in non-dollar currencies for dollar loans. It will not lend money if financing is available on reasonable terms from other Western sources. Also, it does not compete with the Export-Import Bank or the World Bank. Activities are favored that may lay a base for further investment such as in power, transportation, communications, irrigation and reclamation projects. To date, the DLF has financed at least 11 separate private CPI plants in seven countries. Address: 1025 Fifteenth St. NW, Washington, D.C.

International Cooperation Administration: This agency encourages and aids U.S. private investment in underdeveloped countries with special concern for equity and licensing arrangements. It tries to eliminate or lessen snags in investment projects. For example, it offers the Investment Guaranty Program to insure against nonbusiness risks of foreign investment, such as the inability to convert local currency receipts, expropriation and war damage. Address: 815 Connecticut Ave. NW, Washington, D.C.

International Monetary Fund: The IMF promotes international monetary cooperation, encourages stability by making loans to meet short-term balance of payment problems. The funds can be used to buy from any country—as opposed to Development Loan Fund loans, which emphasize expenditure for U.S. products. Address: 19th and H. Sts. NW, Washington, D.C.

International Bank for Reconstruction and Development: Together with its affiliates, the International Finance Corp. and the International Development Assn., the bank is dedicated to aiding development of productive projects and resources in member countries. The three agencies are similar to IMF; member nations contribute money, and any individual member may borrow from the total accumulation. There are differences in the nature of loans. For example, the IBRD will loan to public and private groups not in the membership if repayment is guaranteed by a member. The IFC cannot invest where private capital is available on reasonable terms. And the IDA cannot lend where private capital is reasonably available or where a loan could be made by the IBRD. Address for all three: 1818 H St. NW, Washington, D.C.

Inter-American Development Bank: The IADB began operating only last October. Patterned after the International Bank, it focuses exclusively on the Western Hemisphere, making additional resources available to Latin America without supplanting international sources of credit now operating. Address: 801 19th St. NW, Washington, DC.

served by guaranteed credit or credit insurance.

Like any other form of insurance, this assumes a calculated risk for a fee. It is offered by most European governments to their own industry, allowing insurance up to about 80% of the total value. Rather than depend on commercial status, it depends on the status of the country in which the plant is to be built and the reliability of the supplier.

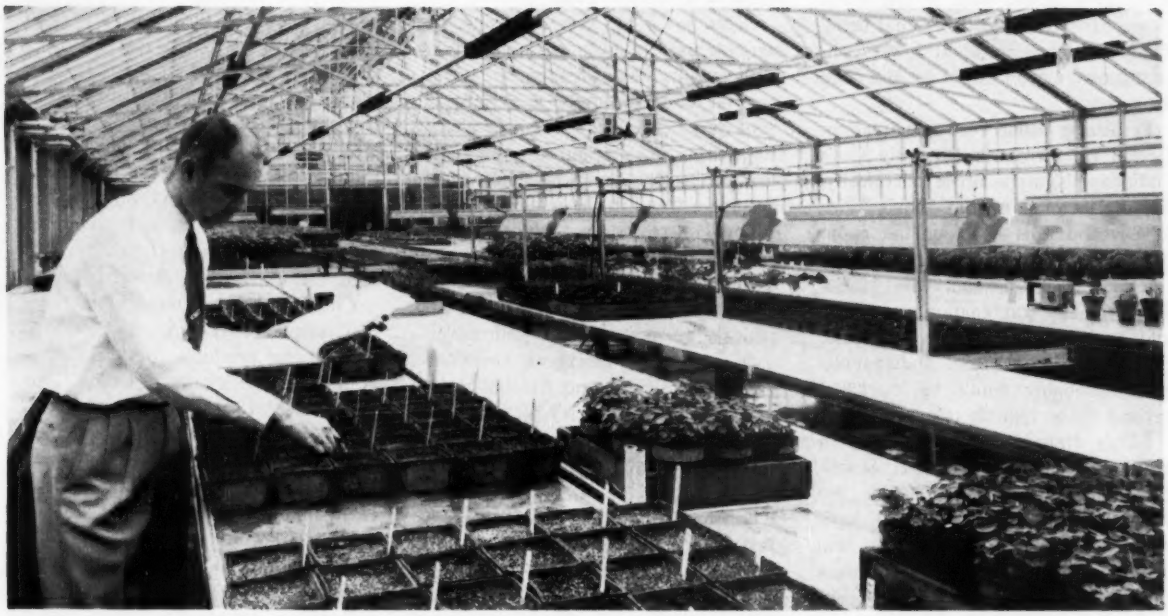
It requires no investigation of the individual plant; it applies directly to the notes payable which the equipment manufacturer receives from the purchaser; and it operates fast.

In France, for example, the French equipment manufacturer can apply directly to its own government for insurance on credit it would extend to a purchaser in a less developed country—it can have an answer within a month. With most European countries operating similarly to this, more and more of the less developed countries are turning to Europe—and to European machinery—for their secondary industry.

But even if European firms do win these sales, the world stands to benefit as the less developed countries become industrialized. Evidence is shown in the chart (*p. 59*), which compares U.S. exports to 11 countries. The chart shows that more developed countries import more, simply because its people consume more. U.S. manufacturers and engineering firms must decide whether they want to share this growing prosperity.

The U.S.'s long-established, independent and self-contained engineering-contracting industry is unique. This industry has developed in a highly industrialized, closely integrated economy, where emphasis is on low competitive bidding and minimum designs (*CW, May 7, '60, p. 40*). Yet a surge of foreign projects (over $170 million in CPI plants in '60) and the increasing activity of the governmental lending agencies give firm evidence that U.S. engineers are learning to adapt themselves to the international scene.

These overseas projects are bringing a true revolution in popular concepts of bidding economics; they show U.S. suppliers assuming a new role as entrepreneurs; and they underscore engineering know-how as a leading commodity for export.



Crab grass research: Pre-emergent products are getting priority in the search for better controls.

Making a Killing in Crab Grass Control

U.S. homeowners, barely finished fighting winter's all-too-visible snow problem, are now being urged to battle a yet-unseen enemy, crab grass. In recent weeks, makers of pre-emergent-type crab grass killers, armed with at least four new chemicals, have opened a promotional campaign to push sales into the $15-million/year range, half again the '60 mark.

Prime markets for the new one-shot, full-season crab grass killers are in the Northern states, where bluegrass, fescues and bent grasses predominate. In these areas crab weed in its smooth (*Digitaria ischaemum*) and hairy *(Digitaria sanguinalis)* forms are now touted to the growing number of suburbanites as the No. 1 turf problem.

Eager Customers: Lawn chemical makers have a receptive customer list, earned by the good records of effective and easy-to-use broad-leaf herbicides such as 2,4-D. Pre-emergent herbicides (preventively used—before the weeds actually appear) have been particularly popular—a circumstance marketers of the pre-emerge chemicals have been quick to exploit.

While almost a half-dozen new chemicals for pre-emergence control have been developed in the last few years there hasn't been a new post-emergent product since '58. The new items may well change the current buyer emphasis that has given post-emergents about 55% of the total market.

Among the newer chemicals now sharing the major part of the consumer market for pre-emergence crab grass control are such generics as diphenatrile, dacthal, zytron and calcium propyl arsonate. Somewhat older, but still used widely, are chlordane and calcium arsenate (and lead arsenate to a lesser extent).

Dow's Debut: The splashiest sales push this season has been mounted behind Dow Chemicals' Dow Crab Grass Killer. This product, Dow's first big garden chemical, is based on zytron (chemically, O-[2,4-dichlorophenyl] O-methyl isopropylphosphoramidothioate), a material Dow discovered about six years ago. The new product, backed by a $500,000 promotion budget, has been in some test markets for as long as two years, is being sold this year in the full tier of 14 Northeast and North Central states where crab grass is a problem. Dow's product is sold as a 4.4% active material on a ground (20-40 mesh) corn-cob carrier, sells for $4.95/8-lb. bag (good for 1,000 sq. ft.) and for $9.95 in the 20-lb. sack. Zytron has been made up as an emulsion, but this form is not yet being offered to the public.

If Dow Crab Grass Killer goes over big, the company will probably bring along three or four related items in the next year.

Diamond's Sparkler: Better established on the market is Diamond Alkali's (Cleveland) crab grass killer, dacthal (chemically, the dimethyl ester of tetrachloroterephthalic acid). Developed for Diamond Alkali at Boyce Thompson Institute (Yonkers, N.Y.), the material is currently being used in several products marketed by Swift & Co. (Chicago). One is Rid, which was introduced in limited markets last year and is now being sold nationwide through a variety of outlets, in $8.65, 25-lb. bags (good for 2,500 sq.ft.). The other is Vitigro, a similarly used formulation sold at $9.65/30-lb. bag only by traditional garden-supply stores.

Diamond also sells the material itself to commercial nurseries, in 5-lb. bags of 50% wettable powder. In

effectivenes, zytron and dacthal are remarkably similar (both get about 99% of the weed in one shot): a case can be made for dacthal being somewhat more active at lower concentrations; zytron might get the edge for safety.

Fertilizing Killer: Newer than either dacthal or zytron is Eli Lilly Co.'s (Indianapolis) diphenatrile (chemically, diphenylacetonne nitrile). Lilly's Alanco Division sells it under the name Greenfield Crab Grass Killer, combines it in that product with 10-6-4 fertilizer. The combination product is sold only by Lilly, in the Cleveland, Cincinnati, Dayton and Indianapolis areas, probably won't be marketed beyond those regions this summer.

Lilly's diphenatrile is also used in products manufactured by Smith-Douglass (Norfolk, Va.) under the Formite label and by American Agricultural Chemical Co. under the name Agrico Pre-Emerge Crab Grass Control. The latter name may not stick, however: Dow has a "pre-emerge" tag on one of its farm chemicals, may dispute Agrico's use of the term.

Amchem Addition: One of the most promising pre-emergence control chemicals is calcium propyl arsonate, a material developed by Vineland Chemical (Vineland, N.J.). A pre- and post-emergent product, it's currently being used in Amchem Products' No-Crab and Enz, a product of O. E. Linck Co. (Clifton, N.J.). One big selling point for this formulation is its effectiveness in low dosages—5 lbs. is suggested use for 1,000 sq.ft. (most crab grass pre-emergents call for dosages of around 10-15 lbs./1,000 sq. ft.). Another point in the material's favor: it permits immediate reseeding of grass after application (most pre-emergents do not).

Chlordane Continues: Although originally developed as an insecticide, chlordane (chemically, octachloro-4,7-methano-tetrahydroindane) was found by Michigan State College researchers to be a good selective crab grass killer, and has been used for that purpose since the late-'50s. Probably the best-known consumer product based on chlordane is O. M. Scott's (Marysville, O.) Halts. That product is in its third year of marketing and is one of the company's top-selling items. Scott emphasizes the minimum hazard of using Halts on newly seeded lawns. A disadvantage: 60 lbs. of 20%-active material is needed to control crab grass on a one-acre plot.

Scott has a big merchandising advantage over many of its competitors —its own model lawn spreader, which can be used to apply a variety of Scott products, such as seed, fertilizer. Emphasis on specialized equipment tied into garden chemical selling could become a trend in the industry.

Old-Timer: Many of the new growth-regulator-type crab grass chemicals are safer for use by human beings than are the more familiar arsenicals (a point that's well advertised). The pre-emergent chemicals based on calcium and tricalcium arsenate, however, which have been sold since the mid-'50s, have not lost many markets. Products of this type include Vaughan Seed Co.'s (Chicago) Pre-Kill, Chipman Chemical Co.'s (Bound Brook, N.J.) Chip-Cal Granular and Powder, George A. Davis Co.'s (Chicago) B-4 and Sears, Roebuck's Seed Killer.

A big advantage of the arsenical compounds is their comparatively lasting control of crab grass; an autumn application often provides 90% control the following spring. Toxicity and hefty application requirements (18 lbs./1,000 sq.ft. for 48%-active material) are major drawbacks.

A product that doesn't fit exactly into any of the above categories but which is one of the top-selling crab grass pre-emergence products is a proprietary mixture put out by Pax Co. (Salt Lake City). It consists of arsenous oxide, arsenate of lead, heptachlor and ammonium sulfate (nitrogen fertilizer). The Pax product sells well, but has run into some criticism for being too "hot" a fertilizer for some turfs.

More Coming: A number of new products are now under test for pre-emergence use, but none seems likely to hit the market by next year. Progress over the next few years seems most likely to come from improvement of the existing products. One possible source of a new chemical, however, is Niagara Chemical, which says it has had promising research results. Commercial formulations of this product —and of most items now in the lab— are probably more than a season off.

Post Ahead: Although current interest at both the research and sales level is centered around the pre-emergence treatments, the biggest share of the crab grass control market still belongs to the post-emergence types (one trade source breaks it down to 35% pre, 65% post).

Among the post-emergence types there's been substantially little change over the last five years (*CW, May 5, '56, p. 74*). Chemicals such as disodium methyl arsonate (DMA), amine methyl arsonate (AMA), phenyl mercuric acetate (PMA) and potassium cyanide, which were mainly used then, are still favored materials today.

Currently the two most widely used materials are DMA and AMA. Among the products using AMA in liquid formulations are Union Carbide's Eveready Crab Grass Killer, Du Pont's Crab Grass Killer, Vaughan Seed's Liquid KO (which also contains 2,4-D), Vineland Chemical's Super Crab E-Rad, Boyle-Midway's (Cranford, N.J.) Antrol and Ortho Chemical's Liquid Crab Grass Killer.

Products using the older DMA (mostly in powder form) include Vaughan Seed's KO (nonliquid type), Northrup King's Crab-X and Scott's Clout, Amchem's Sodar Crab Grass Killer, International Minerals' Void, and Cleary Chemical's (New Brunswick, N.J.) Methar.

Vineland Chemical and Cleary, after some legal tussling, now share proceeds from an end-use patent (U.S. 2,678,265) for the use of DMA and AMA for crab grass control.

More Coming: A company not now in post-emergence crab grass markets but slated for entry soon is Armour Agricultural Chemical Co. Since the company claims no new materials in field tests, it probably will buy an existing material, sell it under the Armour label.

Although many weed-control experts feel that post-emergence chemicals give better control over-all than pre-emergence types, there's little doubt which way the market is going —toward pre-emergents—or why. It isn't simply a case of providing more convenience or safety to the consumer; it's a case of more realistic appraisal of the potential market. The homeowner who's willing to spend $10 to keep a small lawn safe from crab weed is also more than likely to keep it fertilized and watered—which cuts down on the incidence of crab grass. By selling this customer before

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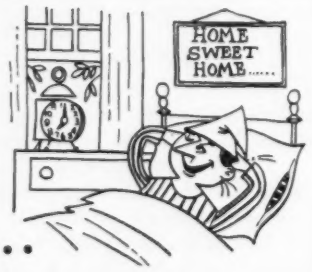

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he ever sees how much crab grass he actually has (not all years are "good" for crab grass) the weed-killer suppliers enlarge their markets by aiming at lawns which may need crab grass control and those that may not.

USDA Unenthusiastic: Support for claims that crab grass killers are perhaps oversold comes from a U.S. Dept. of Agriculture representative. "Most homeowners," he tells CHEMICAL WEEK, "don't need crab grass killers; they simply need to take better care of their lawn. Herbicides are a part of lawn management, not a supplement or replacement. Makers of weed killers are abusing the public with claims about their products, and usually people are simply wasting money by buying them." In sort of a plague-take-both-your-houses dismissal to both pre- and post-emergence materials, he added, "All are high priced, and prices have no relation to supply, demand or production cost."

Despite the absence of a USDA benediction, suppliers of crab grass products are looking forward to their best year in history. The pre-emergence season extends from about March 1 to mid-May. If the garden supply sellers miss the pre-emergence customer, they'll push heavily with the post-emergence products. Since crab grass killers are now reaching only about 25% of the potential market, garden supply sellers and chemical makers now view that pesky annual grass as a source of nicely blooming, perennial profits.

Bond and Blow

Naugatuck Chemical Division of United States Rubber Co. (New York) has a new patent (U.S. 2,964,799) on a technique for foaming sheet plastic laminated to a fabric backing.

The foam is made by using a chemical blowing agent, which is blended into specially formulated vinyl compound before it is formed into a sheet. After the sheet has been laminated to a fabric backing, the laminate is heated, causing the blowing agent to turn into a gas, which expands the film into foam.

About eight companies are already using this technique for making foam-plastic fabric combinations, and others are reported planning to enter the field.

Naugatuck hasn't decided whether

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Cellulose Acetate	X		XX				
Latex					XX		XX
Nitrocellulose	X	X				X	XX
Paints, Oil-Base		XX	XX	XX		X	
Paints, Water-Base	X	X	X	XX	XX		
Polyester Resins	XX			X			X
Polyolefin Resins†							
Polystyrene	XX					XX	
Polyvinyl Chloride (PVC)	X		XX			X	
Rubber	XX					XX	
Urea-Formaldehyde Resins							XX
Urethanes		XX	X	XX			
Varnish	XX	XX	X	X		X	

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to license its now-patented process or allow it to be used royalty-free.

The material, designed to resemble kid leather, is being used for outerwear, shoes, slippers, hats, handbags, and furniture and auto upholstery fabric.

Industrial Re-emphasis

S. C. Johnson & Son, Inc. (Racine, Wis.), will step up research and marketing programs for its industrial coatings line.

Initially the company will classify its 17 coatings into four tradenamed groups. The Perma-Cote tradename will include clear solvent-base waxes or resins; Bright Plate, resin emulsions; Wax Plate, wax emulsions; and Solve Cote, solvent-base waxes.

Later these lines will be sold through Johnson's national sales force for industrial products instead of by a specialized sales staff working out of the company's Racine headquarters.

Johnson plans to give top priority to Perma-Cote 61, a new nonyellowing protective coating for aluminum. It is reported to protect aluminum curtain walls, doors, windows and store fronts from both acid and alkali damage.

PRODUCTS

Snoop for Leaks: Nuclear Products Co. (15636 Saranac Rd., Cleveland) is selling a new liquid leak detector called Snoop. When applied to connections in pressurized air or gas lines, the product forms bubbles where there are leaks. Snoop is packaged in 8-oz. polyethylene squeeze bottles with an adjustable tube.

•

Sand Binder: Union Carbide Plastics Co. (New York) has developed a finely powdered, thermosetting sand binder, especially designed for production of cold-coated sands. Bakelite phenolic resin BRP-8875 is said to give a free-flowing, nonblocking coated sand with good storage properties.

•

Aluminum Dyes: Carbic-Hoechst Corp. (270 Sheffield St., Mountainside, N.J.) has added five new aluminum dyestuffs to its range of colors for anodized aluminum. All are homogeneous products with "good to excellent" fastness to light.

Tracers

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Flavor Chemist. New Jersey company, a leader in its field, has an opening for a chemist of proven ability able to develop own formulas. Replies held in strict confidence. P-6429, Chemical Week.

Director of Sales-Rapidly expanding listed heavy chemical manufacturer with excellent growth picture desires top-flight sales executive with heavyweight experience primarily in industrial inorganics. Compensation commensurate with ability. P-6415, Chemical Week.

Dynamic firm active in organic surfactants and specialty organic manufacture desires energetic individual to assume responsibility as Director of Research and sustain rapid growth of firm. Excellent opportunity for the individual with related background. Send resume to P-6416, Chemical Week.

Production Supervisor. Chemist or Chemical Engineer conversant with small organic operations. Applicants must have 5 to 10 years experience preferably with small or medium size company, in all phases of production of organic chemicals. Our staff knows of this opening. P-6433, Chemical Week.

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Ch.E.-5 yrs. dev. and prod. of syn. organic chemicals: planning and supv. of reactions and refining. Can write well. Adaptable, likes to learn, wants responsibility. Married. Will relocate. Pres. sal. $9000. Seeks improvement. PW-6425, Chemical Week.

POSITIONS WANTED

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Management-Chemical Engineer. Experienced plant manager, assistant plant manager, plant superintendent, production superintendent. Broad chemical, fats, oils, food experience. Excellent record. PW-6442, Chemical Week.

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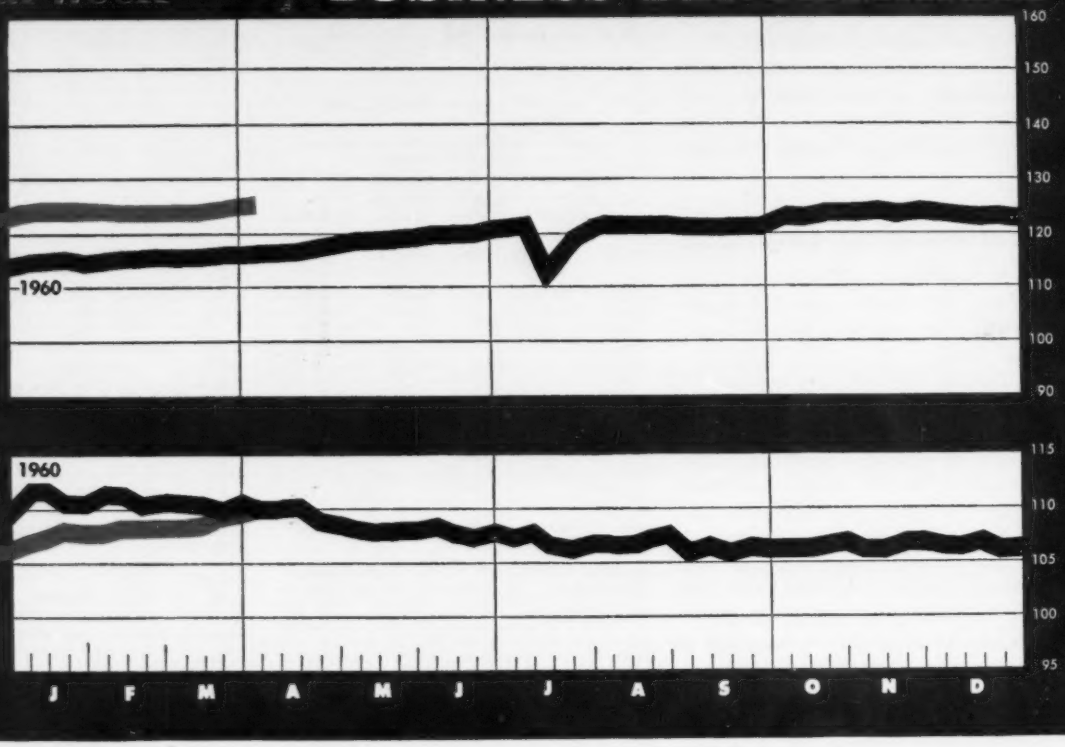

APRIL 1, 1961

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output (1957=100)	125.4	125.2	118.4
Chemical Week wholesale price index (1947=100)	110.9	110.4	110.7
Stock price index (12 firms, Standard & Poor's)	51.68	50.71	53.07
Steel ingot output (thousand tons)	1,574	1,573	2,607
Electric power (million kilowatt-hours)	14,294	14,353	14,219
Crude oil and condensate (daily av., thousand bbls.)	7,353	7,353	7,116

PRODUCTION INDICATORS (1957=100)	Latest Month	Preceding Month	Year Ago
All manufacturing	102	101	112
Nondurable goods manufacturing	110	109	112
Durable goods manufacturing	96	95	112
Chemicals and allied products	120	118	120
Industrial chemicals	125	127	128
Petroleum and coal products	106	106	103

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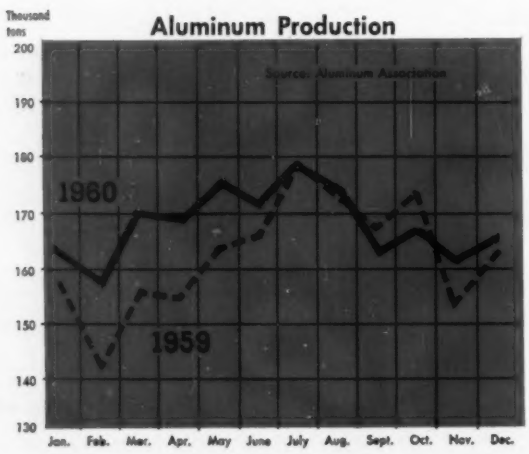

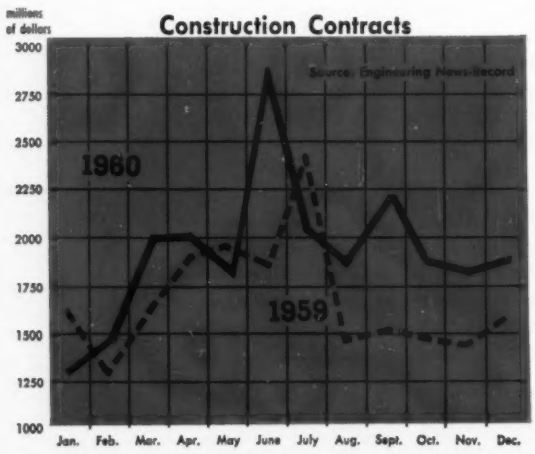

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